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# Index to NASA Tech Briefs 1973



February 1974

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NASA SP-5021 (1+)  
Index to NASA Tech Briefs  
1973  
February 1974

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# Introduction

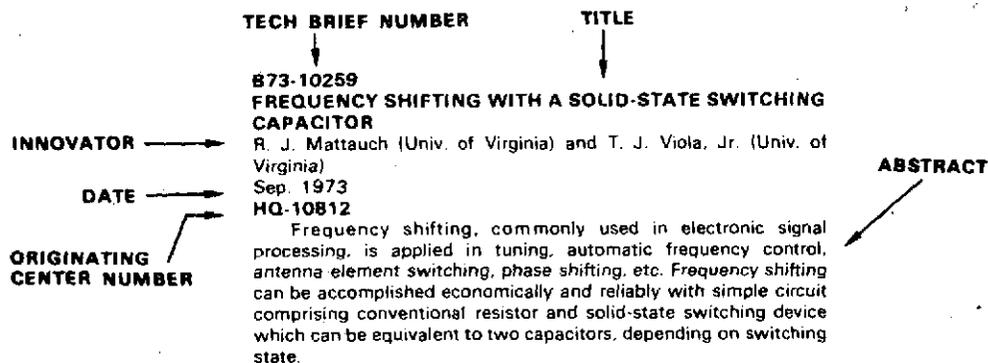
Tech Briefs are short announcements of new technology derived from the research and development activities of the National Aeronautics and Space Administration or the U.S. Atomic Energy Commission. These briefs emphasize information considered likely to be transferrable across industrial, regional, or disciplinary lines and are issued to encourage commercial application.

This *Index to NASA Tech Briefs* contains abstracts and four indexes—subject, personal author, originating Center, and Tech Brief number—for 1973 Tech Briefs.

## Abstract Section

The abstract section is divided into nine categories: Electronics/Electrical; Electronic/Electrical Systems; Physical Sciences; Materials/Chemistry; Life Sciences; Mechanics; Machinery, Equipment, and Tools; Fabrication Technology; and Computer Programs. Within each category, abstracts are arranged sequentially by Tech Brief number.

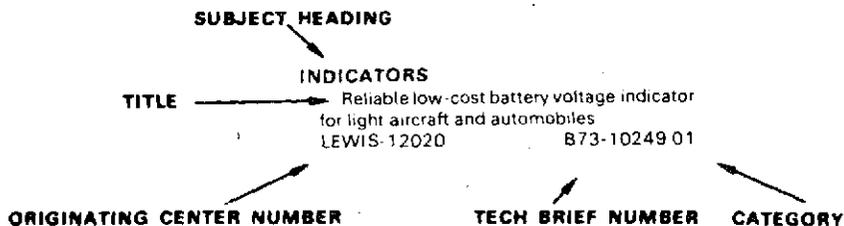
A typical abstract entry has these elements:



The originating Center number in each entry includes an alphabetical prefix that identifies the NASA Center or Atomic Energy Commission office where the Tech Brief originated. A list of prefixes and the corresponding Center names are given on page iii.

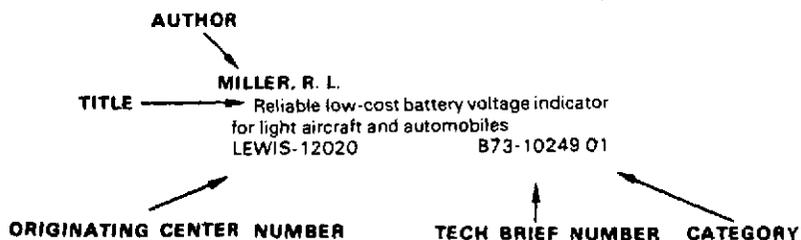
## Indexes

Four indexes are provided. The first is a subject index, arranged alphabetically by subject heading. Each entry in the subject index includes a Tech Brief number and a category number to aid the user in locating pertinent entries in the abstract section.



The preliminary edition of the *NASA Thesaurus* (December 1967) (NASA SP-7030) is used as the authority for the indexing vocabulary that appears in the subject index. The *NASA Thesaurus* should be consulted in examining the current indexing vocabulary, including associated cross-reference structure. Only the subject terms that have been selected to describe the documents abstracted in this issue appear in the subject index. Copies of the *NASA Thesaurus* may be obtained from the National Technical Information Service or the U.S. Government Printing Office at \$8.50 for the three-volume set. The first two volumes of this Thesaurus, consisting of the alphabetical listing of subject terms (A-Z), have been superseded by the following single-volume publication: *NASA Thesaurus Alphabetical Update* (September 1971) (NASA SP-7040), available from NTIS for \$6.00. (Volume III of the Preliminary Edition consists of the following ancillary aids to vocabulary selection: hierarchical display of index terms, category term listing, permuted index, and a listing of postable terms only.)

The second index is a personal author index. Entries in this index are arranged alphabetically by author's name. Tech Brief and category numbers are supplied to help the user find the appropriate entries in the abstract section.



The third index relates each originating Center number to the corresponding Tech Brief number and category. Entries in this index are arranged in alphanumeric order by Center number.



The fourth index relates each Tech Brief number to its originating Center number. Entries are arranged in ascending Tech Brief number order.



## Originating Center Prefixes

### NASA

ARC	Ames Research Center
GSFC	Goddard Space Flight Center
HQ	NASA Headquarters
JSC	Johnson Space Center (formerly Manned Spacecraft Center)
KSC	Kennedy Space Center
LANGLEY	Langley Research Center
LEWIS	Lewis Research Center
M-FS	Marshall Space Flight Center
NPO	NASA Pasadena Office
XAC	Ames Research Center
XGS	Goddard Space Flight Center
XLA	Langley Research Center

### Atomic Energy Commission

LRL	Lawrence Radiation Laboratory
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# Index to NASA Tech Briefs

February 1974

## Abstract Section

### 01 ELECTRONICS/ELECTRICAL

**B73-10004**  
**IMPULSE COMMUTATING CIRCUIT WITH TRANSFORMER TO LIMIT REAPPLIED VOLTAGE**

J. H. McConville (Martin Marietta Corp.)  
Mar. 1973

**LEWIS-11849**

Silicon controlled rectifier opens circuit with currents flowing up to values of 30 amperes. Switching concept halves both current and voltage in middle of commutating cycle thereby lowering size and weight requirements. Commutating circuit can be turned on or off by command and will remain on in absence of load due to continuous gate.

**B73-10016**  
**SIGNAL CONDITIONER FOR POTENTIOMETER TYPE TRANSDUCERS**

E. C. Armentrout and E. Gross  
Mar. 1973

**LEWIS-11822**

Low cost method is described for signal conditioning of pot-type transducers utilizing printed circuitry. Conditioner fits into standard rack, accommodates 56 channels, and can be operated by one attendant.

**B73-10035**  
**DIGITAL DATA COMMAND BUS**

G. C. Milligan  
Feb. 1973

**NPO-11637**

Command bus constructed from coaxial cable has short segments of its outer jacket and shield removed and replaced with small ferrite cores carrying multitem windings connected to decoder. Device reduces number of wire pairs required to communicate command data to systems and subsystems.

**B73-10054**  
**GLASS ENCAPSULATION PROVIDES EXTRA PROTECTION FOR IC SEMICONDUCTOR DEVICES**

W. L. Doelp, Jr. (Philco-Ford Corp.)  
Feb. 1973

**M-FS-21310**

Oxide-passivated semiconductor chip is given protective glass coating by means of vapor deposition over metallic substrate of integrated circuit (IC). Method provides more reliable oxide-passivation and hermetic sealing in current use. Chips and scratches incurred during dicing, testing, and assembly are markedly reduced.

**B73-10055**  
**FLAT CONDUCTOR CABLE SURVEY**

C. R. Swanson (Hayes Intern. Corp.) and G. L. Walker (Hayes

Intern. Corp.)

Feb. 1973

**M-FS-22493**

Design handbook contains data and illustrations concerned with commercial and Government flat-conductor-cable connecting and terminating hardware. Material was obtained from a NASA-sponsored industry-wide survey of approximately 150 companies and Government agencies.

**B73-10096**  
**FABRICATION OF MAGNETIC BUBBLE MEMORY OVERLAY**

Innovator not given (IBM) Mar. 1973

**M-FS-22377**

Self-contained magnetic bubble memory overlay is fabricated by process that employs epitaxial deposition to form multi-layered complex of magnetically active components on single chip. Overlay fabrication comprises three metal deposition steps followed by subtractive etch.

**B73-10097**  
**A PROPOSED ADJUSTABLE RF CABLE CONNECTOR**

E. J. Stringer (Rockwell Intern. Corp.) and J. D. Doyle (Rockwell Intern. Corp.)

Mar. 1973

**M-FS-24271**

In system that requires negligible loss, it may be necessary to adjust cable length to exact multiple of transmitted wavelength. Adjustable cable connector saves time and cost by eliminating need to add to or cut from cable. Device was especially designed for use with high frequencies. For particular application, connector of suitable dimensions should be used.

**B73-10109**  
**A NEW PACKAGING AND TESTING CONCEPT FOR MICROELECTRONIC COMPONENTS**

G. L. Filip and S. V. Caruso  
May 1973

**M-FS-20936**

Parts are securely held on sealed, printed circuit board that is both package and test fixture. Parts can be handled, stored, and tested in sealed package.

**B73-10135**  
**LOW PHASE-NOISE DIGITAL FREQUENCY DIVIDER**

G. F. Lutes  
Mar. 1973

**NPO-11569**

Digitally generated countdown pulse at submultiple frequency is applied to one electrode of FET gate to establish threshold state; gate cannot function until desired portion of reference half-wave pulse which is to be passed appears on second electrode.

**B73-10138**  
**BRAID READ-ONLY MEMORY**

J. F. McKenna (MIT)  
Mar. 1973

## 01 ELECTRONICS/ELECTRICAL

### NPO-11570

Transformer-type memory is fault-tolerant array of independent read-only memory units. Information pattern in each unit is written by weaving wires through array of linear (nonswitching) transformers. Presence or absence of a bit is determined by whether a given wire threads or bypasses given transformer.

### B73-10139

#### SIMULTANEOUS PROCESSING OF VIBRATION TEST DATA

E. E. Reddeman

Mar. 1973

### NPO-11616

Data from record tracks of all accelerometers is injected simultaneously into electronic circuits which convert inputs into single, composite graphical representation. Three adequate methods of processing data: peak acceleration at a frequency, average of all channels, and quad-mean of all channels.

### B73-10152

#### A VACUUM CHAMBER FEEDTHROUGH

V. D. Brown (Memphis State Univ.)

Mar. 1973

### M-FS-21133

Simple and inexpensive microwave feedthrough has been designed which transfers 130 ns, 5KV pulse into vacuum chamber. Feedthrough may be used over wide range and is adaptable to most coaxial cables, since either multistrand or single strand center conductor cable can be used.

### B73-10160

#### SYNCHRO PHASE SELECTOR AID

F. H. Austin and G. C. Moen

May 1973

### LANGLEY-11282

Phase selector permits multiple leads of synchro devices to be randomly connected while proper interconnections are determined by operating selector switches. Operation of these switches varies both phase and rotation relationship of synchro devices.

### B73-10164

#### LIQUID METAL POROUS MATRIX SLIDING ELECTRICAL CONTACT: A CONCEPT

H. Ferguson

Jun. 1973

### LEWIS-11735

Concept utilizes porous metal or nonmetal matrix containing liquid metal in porous structure and confines liquid metal to contact area between rotor and brush by capillary forces. System may also be used to lubricate bearing systems.

### B73-10171

#### COMPACT 20-KILOAMPERE PULSE-FORMING-NETWORK CAPACITOR BANK

S. J. Posta and C. J. Michels

May 1973

### LEWIS-12009

Bank uses commercially available high-energy-density capacitors for energy storage and silicon-controlled rectifiers for switching. Low voltage design employing solid-state switching is utilized in lieu of conventional gas discharge switching.

### B73-10174

#### COMPLEMENTARY MOS FOUR-PHASE LOGIC CIRCUITS

H. L. Petersen (Lockheed Missiles & Space Co.) and D. K. Kinell (Lockheed Missiles & Space Co.)

Jun. 1973

### JSC-14240

Technique can provide four-phase clock signal from single-phase clock and requires only one power supply voltage. This arrangement saves considerable power compared to circuits having load resistor between power supply and ground.

### B73-10179

#### MICROSTRIP ANTENNAS

J. Q. Howell

Jun. 1973

### LANGLEY-11284

It is possible to design and construct simple, efficient microwave antenna, either linearly or circularly polarized, which should be useful in phased arrays. Mounted on thin dielectric substrate, it extends slightly above ground plane. Space behind ground plane is required for feed line and mounting hardware.

### B73-10185

#### PROPOSED ELECTROMAGNETIC WAVE ENERGY CONVERTER

R. L. Bailey (Catholic Univ.)

Jun. 1973

### GSFC-11394

Device converts wave energy into electric power through array of insulated absorber elements responsive to field of impinging electromagnetic radiation. Device could also serve as solar energy converter that is potentially less expensive and fragile than solar cells, yet substantially more efficient.

### B73-10196

#### AN IMPROVED METHOD FOR OBTAINING A NORMALIZED JUNCTION TEMPERATURE FOR SEMICONDUCTORS: A CONCEPT

S. N. Trivedi (Martin Marietta Corp.)

Jun. 1973

### JSC-14136

Failure rate for given semiconductor device is simply determined by reading value of normalized junction temperature from printout for any given combination of ambient temperature, stress ratio, and maximum rated junction temperature, and obtaining corresponding failure rate from graph.

### B73-10197

#### P-CHANNEL SILICONE GATE FET

S. Ostis (Sperry Rand Corp.) and D. S. Woo (Sperry Rand Corp.)

Jun. 1973

### M-FS-22505

Modified fabrication technique for P-channel, MOSFET devices eliminates problems involving gate placement and gate overlap. Technique provides self-aligned gate, eliminating complexity of mask aligning. Devices produced by this process are considerably faster than conventional MOSFET's and process increases yield.

### B73-10199

#### SRC SEAL TESTING

E. D. Miller (McDonnell Douglas Corp.) and G. J. Kohout (McDonnell Douglas Corp.)

Aug. 1973

### M-FS-22426

Small venthole drilled in semisealed silicon-controlled rectifier (SCR) cavity eliminates entrapped helium. Although these devices show slightly greater leak than those before lead installation, it is now possible to distinguish device with good hermetic seal from defective one.

### B73-10211

#### MANUFACTURE AND QUALITY CONTROL OF INTERCONNECTING WIRE HARNESSSES

Jun. 1973

### M-FS-22511

Four-volume series of documents has been prepared as standard reference. Each volume may be used separately and covers wire and cable preparation as well as harness fabrication and installation. Series should be useful addition to libraries of manufactures of electrical and electronic equipment.

### B73-10237

#### BATTERY CELL THERMAL-CONDUCTIVE COATING INCREASES EFFICIENCY

H. M. Doyle (Martin Marietta Corp.)

Aug. 1973

### LANGLEY-10963

Thin coating of high-temperature epoxy resin provides necessary electrical insulation, as well as good thermal conductivity between battery cells. Insulation increases efficiency of nickel-

cadmium battery, as it would any multicell battery assembly in which cell-to-cell thermal balance is critical.

**B73-10249**  
**RELIABLE LOW-COST BATTERY VOLTAGE INDICATOR FOR LIGHT AIRCRAFT AND AUTOMOBILES**

R. L. Miller  
 Dec. 1973

**LEWIS-12020**

Voltage indicator fits into cigarette lighter socket and utilizes light emitting and Zener diodes to display three levels of battery voltage. Indicator is superior to typical conventional electrical system indicators in that it gives a positive discrete indication of battery voltage. It is simple, inexpensive, and rugged.

**B73-10259**  
**FREQUENCY SHIFTING WITH A SOLID-STATE SWITCHING CAPACITOR**

R. J. Mattauch (Univ. of Virginia) and T. J. Viola, Jr. (Univ. of Virginia)

Sep. 1973

**HQ-10812**

Frequency shifting, commonly used in electronic signal processing, is applied in tuning, automatic frequency control, antenna element switching, phase shifting, etc. Frequency shifting can be accomplished economically and reliably with simple circuit comprising conventional resistor and solid-state switching device which can be equivalent to two capacitors, depending on switching state.

**B73-10264**  
**MULTILAYER FLAT ELECTRICAL CABLE**

P. G. Silverman (TRW Systems Group)

Jun. 1973

**ARC-10734**

Flat electrical cable is lightweight, flexible over wide temperature range, withstands continuous exposure to high levels of nuclear radiation, and can carry high currents with minimum of temperature rise. Its magnetic cleanliness is equal to or better than twisted pair of wires, and it can be terminated in conventional electrical connector.

**B73-10278**  
**EVENT-SEQUENCE DETECTOR**

M. F. Hanna

Jun. 1973

**NPO-11703**

Detector consists of matrix of storage elements which are activated by coincidence of failure-voltage pulses and clock pulses. Clock frequency used for event sequence detector can be selected to provide time resolution demanded by test at hand.

**B73-10286**  
**A NEW METHOD FOR THE DETERMINATION OF THIN FILM POROSITY**

T. R. Beck (Boeing Co.), C. J. Bishop (Boeing Co.), and W. F. Springgate (Boeing Co.)

Sep. 1973

**HQ-10673**

Internal reflection spectroscopy may be used to determine presence of water in thin film pores. Presence of water in such pores is function of relative humidity and pore size. Thus, one can determine pore size by controlling humidity. Fluids with surface tension different from that of water can be used to detect pores.

**B73-10292**  
**MINIMAL HARDWARE, BINARY SEQUENCE PSEUDO-NOISE GENERATOR AND DETECTOR**

M. Perlman

Jul. 1973 See also JPL-TR-32-1432

**NPO-11406**

General purpose sequence generator which includes 35-stage field shift register determines mathematical properties of polynomials such as divisibility, period, order of roots, and other parameters that effect desirability of various sequences for specific applications; for example, irreducible polynomials which characterize sequences with randomness properties.

**B73-10295**  
**SILICON SWITCHING TRANSISTOR WITH HIGH POWER AND LOW SATURATION VOLTAGE**

E. Stonebraker (Westinghouse Elec. Corp.), D. Stoneburner (Westinghouse Elec. Corp.), and H. Ferree (Westinghouse Elec. Corp.)

Jul. 1973 See also NASA-CR-112870

**NPO-11565**

Assembly of two individually encapsulated silicon-chip transistors produces silicon power-transistor that has low electrical resistance and low thermal impedance. Electrical resistance and thermal impedance are low because of short lead lengths, and external contact surfaces are plated to reduce resistance at interfaces.

**B73-10304**  
**AN ELECTRIC MOTOR WITH MAGNETIC BEARINGS: A CONCEPT**

P. A. Studer

Aug. 1973

**XGS-07805**

Because same magnetic flux is used to control rotor as to drive it, size, weight, and power required are minimized. Constant total current keeps motor torque invariant, and absence of mechanical bearings eliminates wear and reduces frictional power loss.

**B73-10333**  
**MILLIMETER-WAVE ANTENNA SYSTEM**

J. Evans and W. I. Gould, Jr.

Sep. 1973

**GSFC-10949**

Parabolic reflectors fabricated from Carbon Fiber Reinforced Plastic (CFRP) composite material will not distort their shape by more than 3 percent of millimeter wavelength, despite large temperature differences on reflector surfaces. CFRP has zero thermal expansion. It is derived from charred polyacrylonitrile plastic filaments that are combined with epoxy resin.

**B73-10346**  
**OPERATIONAL SLOPE-LIMITING CIRCUIT**

A. Engel

Aug. 1973

**NPO-11773**

Circuit limits slope of arbitrary waveform to avoid exceeding rate limit of subsequent amplifier, or to form trapezoidal wave with adjustable rise and fall rates from square wave of arbitrary frequency. Integrator provides delay needed to develop output waveform. DC coupling is used to preserve original dc offset.

**B73-10350**  
**ALL-DIGITAL PHASE-LOCK LOOPS FOR NOISE-FREE SIGNALS**

T. O. Anderson

Aug. 1973

**NPO-11914**

Bit-synchronizers utilize all-digital phase-lock loops that are referenced to a high frequency digital clock. Phase-lock loop of first design acquires frequency within nominal range and tracks phase; second design is modified for random binary data by addition of simple transition detector; and third design acquires frequency over wide dynamic range.

**B73-10351**  
**FREQUENCY CONTROL CIRCUIT FOR ALL-DIGITAL PHASE-LOCK LOOPS**

T. O. Anderson

Aug. 1973 See also B73-10350

**NPO-11936**

Phase-lock loop references all its operations to fixed high-frequency service clock operating at highest speed which digital circuits permit. Wide-range control circuit provides linear control of frequency of reference signal. It requires only two counters in combination with control circuit consisting only of flip-flop and gate.

**B73-10356**  
**DATA-AIDED CARRIER TRACKING LOOPS**  
 W. C. Lindsey and M. K. Simon  
 Aug. 1973  
 NPO-11282

Power in composite signal sidebands is used to enhance signal-to-noise ratio in carrier tracking loop, thereby reducing radio loss and decreasing probability of receiver error. By adding quadrature channel to phase-lock-loop detector circuit of receiver, dc component can be fed back into carrier tracking loop.

**B73-10366**  
**SAFE ELECTRICAL RECEPTACLE AND MODIFIED PLUG**  
 L. W. Rabb (Boeing Co.)  
 Oct. 1973  
 KSC-10817

Recently-developed electrical receptacle has internal sliding protective cover that prevents accidental contact with live terminals. Sliding protective cover is used in combination with modified male plug. Design provides excellent protector against electrical shock and should interest manufacturers of electrical connectors.

**B73-10368**  
**A HIGH-SPEED SPECTROGRAPH SHUTTER**  
 M. H. Miller (Maryland Univ.) and S. M. Wood, Jr. (Maryland Univ.)  
 Oct. 1973 See also NASA-CR-72660  
 HQ-10635

Device can operate in close-open-close mode. Beam splitter placed behind static-slit assembly allows use of more than one camera. Each frame in particular series may be conveniently varied in exposure time and spacing. This can be done independent of other frames in the series. In "open" position, shutter transmits light over wide wavelength range.

**B73-10374**  
**SILICON-FIBER BLANKET SOLAR-CELL ARRAY CONCEPT**  
 J. T. Eliason (Sperry Rand Corp.)  
 Oct. 1973  
 M-FS-22458

Proposed economical manufacture of solar-cell arrays involves parallel, planar weaving of filaments made of doped silicon fibers with diffused radial junction. Each filament is a solar cell connected either in series or parallel with others to form a blanket of deposited grids or attached electrode wire mesh screens.

**B73-10386**  
**NOMOGRAPH FOR PREDICTION OF RF-BREAKDOWN VOLTAGES**  
 F. S. Hickernell (Motorola, Inc.) and B. E. Mathes (Motorola, Inc.)  
 Sep. 1973  
 NPO-11819

Information in nomograph is derived from data obtained from RF-breakdown tests on components of uniform and nonuniform geometry. Nomograph also can be used in design work to predict breakdown margins; if operational minimum pressure is established giving minimum value on nomograph, minimum breakdown voltage consistent with allowed value can be predicted.

**B73-10387**  
**GATED COMPRESSOR, DISTORTIONLESS SIGNAL LIMITER**  
 R. C. Woodbury  
 Sep. 1973  
 NPO-11820

Comparator/multiplier arrangement is capable of limiting input power to voice coil so that desired maximum current level is never exceeded. Overall test system consists of signal source which produces frequency spectrum required for acoustic test, gated compressor circuit, and power amplifier feeding transducer.

**B73-10390**  
**SAMPLING COMMAND GENERATOR CORRECTS FOR**

**NOISE AND DROPOUTS IN RECORDED DATA**  
 T. O. Anderson  
 Sep. 1973  
 NPO-11886

Generator measures period between zero crossings of reference signal and accepts as correct timing points only those zero crossings which occur acceptably close to nominal time predicted from last accepted command. Unidirectional crossover points are used exclusively so errors from analog nonsymmetry of crossover detector are avoided.

**B73-10393**  
**WELDED PRINTED CIRCUIT (PC) STICK**  
 F. Kreis  
 Oct. 1973  
 GSFC-11773

Printed-circuit stick module has reduced comb technique to six steps, cutting process time by approximately 50%. Method incorporates all type of components into one assembly. It reduces design and fabrication time for 14-lead flat pack to less than four hours and for the 22-lead flat pack to four hours. Average weight of each flat pack is also reduced to 2 g.

**B73-10427**  
**HERMETIC-COAXIAL PACKAGE DESIGN FOR MICROWAVE TRANSISTORS**  
 D. S. Jacobson (RCA)  
 Dec. 1973  
 GSFC-10791

Semiconductor package has been developed for high power semiconductor devices that operate in the GHz-frequency range at several watts. Package includes stud, insulating ring, electrically conductive washer, insulating washer, braze ring, and cap. It is mechanically strong and can be used with variety of circuits.

**B73-10442**  
**GaAs TRANSISTORS FORMED BY Be OR Mg ION IMPLANTATION**  
 R. G. Hunsperger (Hughes Aircraft Co.) and O. J. Marsh (Hughes Aircraft Co.)  
 Feb. 1974  
 LANGLEY-11204

N-p-n transistor structures have been formed in GaAs by implanting n-type substrates with Be ions to form base regions and then implanting them with 20-keV Si ions to form emitters. P-type layers have been produced in GaAs by implantation of either Mg or Be ions, with substrate at room temperature, followed by annealing at higher temperatures.

**B73-10459**  
**DESIGN PARAMETERS FOR TOROIDAL AND BOBBIN MAGNETICS**  
 W. T. McLyman  
 Feb. 1974 See also JPL-TM-33-651  
 NPO-13441

Handbook has been published to facilitate conversion to metric system. Conversion data makes it possible for transformer designers to obtain fast and close approximation of significant parameters. For greater convenience, derivations of some transformer and inductor parameters are also presented.

**B73-10476**  
**PLUG-IN INTEGRATED/HYBRID CIRCUIT**  
 E. J. Stringer (Rockwell Intern. Corp.)  
 Mar. 1974  
 M-FS-24470

Hybrid circuitry can be installed into standard round bayonet connectors, to eliminate wiring from connector to circuit. Circuits can be connected directly into either section of connector pair, eliminating need for hard wiring to that section.

**B73-10509**  
**RF SHIELDED CONNECTORS**  
 A. Fisher and C. Clatterbuck  
 Mar. 1974  
 GSFC-11215

Gap, where cable joins connector housing, is shielded effectively by composite RF shielding made from suitable potting resin material (fumed silica, thixotropic prepolymer composition), conductive coating (silver-filled, flexible, polyurethane resin), and protective jacket (wax coated housing formed around another wax form having contours shaped to match configuration).

**B73-10512**

**NEW STANDOFFS PROVIDE HIGH-RELIABILITY COMPONENT MOUNTING FOR PRINTED WIRING BOARDS**

W. H. McCandless (Martin Marietta Corp.)

Mar. 1974

**LANGLEY-11176**

Designs provide such advantages as inspectable solder joints from both sides of boards; stress relief in lead wires; low-impedance thermal paths; matched coefficients of lead wire thermal expansion; minimum webbing of conformal coatings to lead wires; positive mounting of part bodies to boards; and conductive mass for transient heat sink requirements.

**B73-10515**

**CORRUGATED BATTERY ELECTRODE**

J. McCallum (Battelle Mem. Inst.)

Mar. 1974 See also B73-10519

**GSFC-11368**

Performance of porous electrodes in batteries and other electrochemical cells is greatly improved when supports for active material have pores of uniform size, extending completely through electrodes, from side to side, with no interconnections between pores.

**B73-10519**

**HONEYCOMB BATTERY PLAQUE**

G. R. Schaer (Battelle Mem. Inst.)

Mar. 1974 See also B73-10515

**GSFC-11367**

Performance of porous electrodes in batteries and other electrochemical cells is greatly improved when supports for active material have pores of uniform size, extending completely through electrodes, from side to side, with no interconnections between pores.

**B73-10520**

**DESIGN METHOD FOR MINIMIZING RF VOLTAGE BREAKDOWN**

R. T. Woo

Mar. 1974 See also JPL-TR-32-1500

**NPO-13408**

Research study was conducted and results were published. Using principles of similarity and minimum of experimental data, a number of universal curves have been constructed covering wide range of experimental parameters. Gases other than air, such as argon and carbon dioxide, also are included in study.

## 02 ELECTRONIC/ELECTRICAL SYSTEMS

**B73-10006**

**A REMOTE TEST PARAMETER PROFILE DISPLAY**

J. L. Harrold and J. E. Dudenhofer

Mar. 1973

**LEWIS-11872**

Multiplexed digital recording system with simple interface between it and standard commercially available oscilloscopes was developed. System included: rapid set-up, minimum input cabling, low cost, display expansion capability, and portability.

**B73-10010**

**REMOTE MEASUREMENTS BY TELEPHONE**

R. L. Miller

Mar. 1973

**LEWIS-11704**

Inexpensive device permits measurement and remote interrogation of variables such as voltage, temperature, pressure, or humidity by standard telephone equipment. Remote interrogation of wind direction and velocity, humidity, or water levels on flood-prone river are other possible representative uses for this device.

**B73-10011**

**LOW COST UNIFORM HEAT SOURCE**

R. B. Smith and G. M. Prok

Mar. 1973 See also NASA-TM-X-2374

**LEWIS-11903**

Electrically powered heat source was developed for ground simulation of isotope heat-source assembly in Brayton power system. Heat source, which operates on ordinary 110 vac power, consists of tungsten filament heating element wound onto a spirally grooved boron nitride core and inserted in a hollowed-out graphite hexahedron.

**B73-10043**

**AN AUTOMATIC LIGHTNING DETECTION AND PHOTOGRAPHIC SYSTEM**

R. J. Wojtasinski, L. Holley, J. L. Gray, and R. B. Hoover

Feb. 1973

**KSC-10728**

Conventional 35-mm camera is activated by an electronic signal every time lightning strikes in general vicinity. Electronic circuit detects lightning by means of antenna which picks up atmospheric radio disturbances. Camera is equipped with fish-eye lens, automatic shutter advance, and small 24-hour clock to indicate time when exposures are made.

**B73-10061**

**PROTOTYPE ULTRASONIC INSTRUMENT FOR QUANTITATIVE TESTING**

L. C. Lynworth (Panametrics, Inc.), J. L. Dubois (Panametrics, Inc.), and P. R. Kranz (Panametrics, Inc.)

Feb. 1973

**M-FS-22350**

Ultrasonic instrument has been developed for use in quantitative nondestructive evaluation of material defects such as cracks, voids, inclusions, and unbonds. Instrument is provided with standard pulse source and transducer for each frequency range selected and includes integral aids that allow calibration to prescribed standards.

**B73-10052**

**OVEN TEMPERATURE CONTROLLER FOR ELECTRONIC COMPONENTS**

S. W. Billingsley

Feb. 1973

**GSFC-11466**

Simple, inexpensive circuit has been developed which provides active temperature control to certain precision electronic components such as crystal oscillators and Zener diodes.

**B73-10074**

**MEASURING THE ELECTRIC FIELD OF A CLOUD**

R. J. Wojtasinski and D. D. Lovall

Mar. 1973

**KSC-10731**

Network of electric field measuring stations has been developed to assess lightning hazard of charged clouds. Sensor data are digitized and transmitted to central processing area for display.

**B73-10093**

**FOUR-PHASE DIFFERENTIAL PHASE SHIFT RESOLVER**

P. M. Hopkins (Lockheed Electronics Co.) and W. M. Wallingford (Lockheed Electronics Co.)

Jun. 1973

**JSC-14065; JSC-14066**

Two systems have been developed to resolve phase uncer-

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tainty without transmitting reference signals. In both methods signal is impressed on carrier as differential, rather than absolute, phase shift. At the receiver four-phase demodulation and logic process unambiguously resolves differential phase shift of input carrier.

**B73-10094**

### **CARRIER EXTRACTION CIRCUIT**

K. Solomon (RCA), J.R. Allen (RCA), A. Jackson (RCA), and R. W. Allen (RCA)  
Mar. 1973

**JSC-14262**

Feedback loop extracts demodulated reference signals from IF input and feeds signal back to demodulator. Since reference signal is extracted directly from carrier, no separate reference need be transmitted. Circuit obtains coherent carrier from balanced or unbalanced four-phase signal of varying characteristics.

**B73-10100**

### **AUTOMATIC SPEED CONTROL OF HIGHWAY TRAFFIC**

E. E. Klingman  
Feb. 1973

**M-FS-21791**

Vehicle control system monitors all vehicles in its range, and automatically slows down speeding vehicles by activating governor in vehicle. System determines only maximum speed; speeds below maximum are controlled by vehicle operator. Loss of transmitted signal or activation of emergency over-ride will open fuel line and return control to operator.

**B73-10106**

### **A TECHNIQUE TO ELIMINATE FALSE LOCK IN PCM DEMODULATION**

H. S. Kobayashi

May 1973 See also B73-10107

**JSC-12494**

One loop provides error signal which adjusts voltage controlled oscillator. Second loop multiplies input signal with generated in-phase signal. Both signals are integrated over bit period. First loop detects null which indicates lockup, and second loop emphasizes impact signal information.

**B73-10107**

### **PHASE SHIFT KEYED, PULSE CODE MODULATED SIGNAL SYNCHRONIZER**

H. S. Kobayashi

May 1973 See also B73-10106

**JSC-12462**

Signal is demodulated and synchronized by three loop circuits: "Q" loop uses quadrature signal to stabilize frequency; "B" loop acts on baseband signal to stabilize phase; and decoding "I" loop acts on in-phase signal. Synchronizer may be used to eliminate false-lock.

**B73-10112**

### **DIGITAL NOTCH FILTER**

B. Z. Meers, Jr.

Aug. 1973

**KSC-10182**

Filter determines whether time period of incoming signal matches time preset in filter. When signals do not match, high or low frequency deviation reading is displayed digitally.

**B73-10118**

### **AN AMPERE-HOUR METER FOR BATTERIES**

B. D. Eklund (McDonnell Douglas Corp.)

Jun. 1973

**M-FS-22067**

Up-down counter records charge as well as discharge in tests of rechargeable batteries. System uses reversible counter preset to represent 100% charge. As battery discharges, total count decreases; as battery is recharged, counter moves back to 100% indication.

**B73-10119**

### **NEW MOTOR SHAFT ANGULAR ACCELEROMETER**

**CONCEPT**

F. O. Smetana (North Carolina Univ.)

Mar. 1973

**LANGLEY-11030**

Concept permits measurement of the acceleration of continuously rotating shafts without use of slip rings or telemetry and with little additional inertial load. Concept has application in servomotor control circuits and easy-to-fly airplane controls.

**B73-10122**

### **LEAPS (LASER ELECTRO-OPTICAL ALIGNMENT POLE FOR SURVEYING)**

L. Caudill

May 1973

**GSFC-11262**

Azimuthal bearing between two obscured points is measured by placing laser beam at one of the points. Beam is directed straight up into the air so that some part of it may be detected from any position a reasonable distance away.

**B73-10123**

### **BRAKE WEAR WARNING DEVICE: A CONCEPT**

S. F. Hawkins (Rockwell Intern. Corp.)

May 1973

**JSC-19157**

Heat-insulated wire is introduced through brake shoe and partially into brake lining. Wire is connected to positive terminal and light bulb. When brakes wear to critical point, contact between wire and wheel drum grounds circuit and turns on warning light.

**B73-10126**

### **INTENSIVE CARE ALARM SYSTEM**

J. L. Christensen (George Washington Univ.) and A. L. Herbert (George Washington Univ.)

May 1973

**GSFC-11377**

Inductive loop has been added to commercially available call system fitted with earphone receiver. System transmits high frequency signals to nurse's receiver to announce patient's need for help without disturbing others.

**B73-10127**

### **AUTOMATIC QUADRATURE CONTROL AND MEASURING SYSTEM**

J. F. Hamlet

May 1973

**M-FS-21860**

Quadrature is separated from amplified signal by use of phase detector, with phase shifter providing appropriate reference. Output of phase detector is further amplified and filtered by dc amplifier. Output of dc amplifier provides signal to neutralize quadrature component of transducer signal.

**B73-10129**

### **SOLAR ASPECT DETERMINATION SYSTEM**

W. H. Farthing and H. F. Frisbie

May 1973

**GSFC-11444**

Sensor containing commercially available solid-state position-sensitive light detector provides complete space-vehicle sun or moon vector information.

**B73-10132**

### **DIGITAL VIDEO DISPLAY SYSTEM**

A. I. Zygialbaum, W. L. Martin, and A. Engle

Mar. 1973

**NPO-11342**

System displays image data in real time on 120,000-element raster scan with 2, 4, or 8 shades of grey. Designed for displaying planetary range Doppler data, system can be used for X-Y plotting, displaying alphanumeric, and providing image animation.

**B73-10134**

### **LOW-NOISE MICROWAVE POLARIMETER**

G. S. Levy, D. A. Bathker, and F. E. McCrea

Mar. 1973

**NPO-11512**

Two quarterwave-plate polarizers inserted between rotary waveguide joints transform received signals from arbitrary linear to circular polarizations and then from circular to fixed linear polarizations. Fixed linear polarizations are applied to amplifiers and filters in usual fashion.

**B73-10138****COMPUTER-CONTROLLED VIBRATION TESTING**

C. P. Chapman and B. Sotomayor  
Mar. 1973

**NPO-11612**

System features quickly achieved steady state, increased accuracy of spectrum definition, and true Gaussian amplitude distribution of resulting signals. Controlled shock-tests might also be tried with this system.

**B73-10141****CODE-REGENERATIVE CLEAN-UP LOOP FOR A RANGING TRANSPONDER**

W. J. Hurd

Mar. 1973

**NPO-11707**

Digital processing system phase locks on received ranging signal and creates clean replica of received ranging code. System is broadly applicable to variety of terrestrial ranging problems, including oceanic navigation.

**B73-10144****A NONLINEAR-COHERENCE RECEIVER**

M. K. Simon and W. C. Lindsey (Univ. of Southern Calif.)

Mar. 1973

**NPO-11921**

Mathematical analysis and detailed study of generic model for coherent receiver has demonstrated that nonlinear coherence between given biphase-modulated input signal and supplied reference signal can be used in receivers to improve telecommunication systems.

**B73-10145****POSITIVE CONTACT RESISTANCE SOLDERING UNIT**

R. D. Banta (Boeing Co.)

Mar. 1973

**KSC-10242**

Ohmmeter is used to indicate positive contact between electrodes and workpiece. This permits good soldering and prevents damage to electronic devices.

**B73-10146****A NEW DRY BIOMEDICAL ELECTRODE**

R. S. Luce (Lockheed Missiles & Space Co.) and G. J. Cleveland (Lockheed Missiles & Space Co.)

May 1973

**JSC-14321**

Electronic circuitry contains new operational amplifier which incorporates monolithic super-gain transistors. Electrode does not provide voltage amplification; instead, it acts as current amplifier to make it possible to pick up electrical potentials from surface of highly resistant dry skin.

**B73-10154****TIME-BASED PRIORITY SELECTION FOR ANALOG CIRCUITS**

J. D. Fageol (Rockwell Intern. Corp.)

Jun. 1973

**M-FS-24242**

Unlimited channel capacity multiplexing circuit is hierarchially structured to achieve priority encoding. Circuit could be used for automatic patient monitoring systems and diagnostic test systems in automotive and communications industry.

**B73-10157****AN INEXPENSIVE VEHICLE SPEED DETECTOR**

P. H. Broussard

May 1973

**M-FS-22601**

Low-power minicomputer can plug into automobile cigarette lighter. It measures time it takes observed car to travel premeasured distance and provides immediate readout of speed. Potentially, detector could be manufactured for less than \$200 per unit and would have very low maintenance cost.

**B73-10159****INTEGRABLE POWER GYRATOR**

E. Hochmair (NAS)

May 1973

**M-FS-22342**

Further study of Y-matrix and Z-matrix configuration has led to development of efficient, dependable high-quality gyrators. Efficiency of new gyrators may approach theoretical limit of 78.5% with further improvements. Both designs are comparatively easy to integrate by implementing technology used with conventional operational amplifiers.

**B73-10161****GYRATOR CIRCUIT USING FIELD EFFECT TRANSISTORS**

E. S. Hochmair (NAS)

May 1973

**M-FS-21433**

Gyrator circuit is especially useful in integrated circuits for such purposes as simulating inductors with capacitors. Circuit is adaptable to semifloating and full floating configurations. It has excellent response, low power consumption, and high energy storage capacity.

**B73-10167****BIPOTENTIAL MONITORING WITH INEXPENSIVE OFFICE-TYPE CASSETTE RECORDERS**

R. L. Wilbur (Southwest Res. Inst.)

Jun. 1973

**M-FS-22566**

Low-cost, modified cassette is part of system that accepts biomedical data for storage. System accepts wide range of data and is compactly packaged for portability. Standard office recorder with automatic level control, multiple inputs, radio, and battery operation may be used for recording stage.

**B73-10169****REAL TIME OPTICAL FIGURE SENSOR**

H. J. Robertson (Perkin-Elmer Corp.)

Jun. 1973

**M-FS-22123**

Mirrors produced for various optical systems require precise surface finishing. Sensor, developed for measuring mirror surface, is compensated for interferences from temperature and air disturbances and is capable of measuring mirrors with diameters of up to 2 meters.

**B73-10170****PRE-EMPHASIS DETERMINATION FOR AN S-BAND CONSTANT BANDWIDTH FM/FM STATION**

G. R. Wallace (Sperry Rand Corp.) and W. E. Salter (Sperry Rand Corp.)

May 1973

**M-FS-22135**

Telemetry bands are being reassigned to UHF at 1500 and 2200 MHz. Conversion primarily requires changes in equipment used in RF link, while many of same subcarrier oscillators, mixer amplifiers, and frequency discriminators can be used.

**B73-10173****RECOVERY OF RECORDINGS FROM HEAT DAMAGED MAGNETIC TAPES**

J. F. Melugin and D. E. O'Brien, III

Jun. 1973

**JSC-14219**

Damaged tapes can now be repaired at home as long as damage does not extend to layer-to-layer adhesion within tape roll. Splice repaired section into good roll or cassette for copying. Every effort should be made to complete copying on first run, because fidelity in repaired section deteriorates with each repetition.

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### **B73-10178 DETERMINING DISTANCE TO LIGHTNING STROKES FROM A SINGLE STATION**

L. H. Ruhnke (NOAA)  
Jun. 1973  
**KSC-10698**

Electronic system can rapidly determine location of lightning strikes occurring within 30 km range. Longer distances are also determined, but with reduced accuracy. Studies have shown that lightning bolt emits electromagnetic wavefront; distance to lightning is determined from ratio of magnetic to electric field.

### **B73-10189 SIGNAL CONDITIONER TEST SET**

W. H. Houck and J. D. Stiberg  
Jun. 1973  
**KSC-10750**

Compact, light-weight, solid-state test set can be used to check signal conditioning modules while they are installed in system. Test sets may also be used to cycle ground computer, if it is suspected of malfunctioning, rather than using signal conditioners.

### **B73-10191 JUNCTION RANGE FINDER**

S. Morissette (Illinois Inst. of Tech.), R. G. Sea (Illinois Inst. of Tech.), and M. J. Frazier (Illinois Inst. of Tech.)  
Jun. 1973  
**KSC-10108**

Electronic system locates interferences in radar reception. System utilizes well known frequency-modulated continuous-wave technique to locate objects with nonlinear impedances. FM transmitter generates signal through bandpass filter which eliminates higher order harmonics around carrier frequency.

### **B73-10195 AUTOMATED OPERATION OF AN INSTRUMENTATION FM TAPE RECORDER**

A. S. Asadourian and D. A. Perz  
Nov. 1973  
**LEWIS-11941**

Recorder did not possess erase head nor was it capable of automatically rewinding reel of tape for reuse. Test results show that FM carrier recording signal with sufficient intensity will by itself erase previously recorded data as new data are being recorded. Automatic rewinding was accomplished by adding conventional metal leaders and appropriate circuitry.

### **B73-10202 TETRAD BUBBLE DOMAIN CHIP ARRANGEMENT FOR MULTIPLEXING**

G. S. Almasi (IBM)  
Jun. 1973  
**M-FS-22296**

Rotating magnetic field of bubble domain memory is used to obtain time-division multiplexing of bubble domain circuits into quadrants. Memory bits are assigned on bit-per-chip rather than bit-per-module basis; power is reduced by circulating only portion of bubbles at a time.

### **B73-10217 INTEGRATED P-CHANNEL MOS GYRATOR**

E. Hochmair (NAS)  
Aug. 1973  
**M-FS-22343**

Several circuits can be integrated into one chip for applications which require more than one gyrator. They can also be integrated with other p-channel MOS circuits to eliminate need for external connections. Devices can operate at economical low-power levels, because they use FET amplifiers that do not degrade with decreases in supply.

### **B73-10223 HIGH-SENSITIVITY RECEIVER FOR CO<sub>2</sub> LASER COM- MUNICATIONS**

B. Peyton (Cutler Hammer Corp.), A. Dinardo (Cutler Hammer

Corp.) (Cutler Hammer Corp.), G. Kanischak, R. Lange (Cutler Hammer Corp.), and F. R. Arams (Cutler Hammer Corp.)  
Aug. 1973

**GSFC-11455**

Wideband heterodyne receiver provides detection and demodulation of incident frequency modulated laser signal; search and acquisition circuitry to align two stations; tracking circuitry to maintain spatial alignment; and laser frequency monitor to frequency lock the transmit and local oscillator lasers.

### **B73-10225 IMPROVED DESIGN OF ELECTROPHORETIC EQUIPMENT FOR RAPID SICKLE-CELL-ANEMIA SCREENING**

J. M. Reddick (Howard Univ.) and I. Hirsch (Howard Univ.)  
Feb. 1974  
**GSFC-11794**

Effective mass screening may be accomplished by modifying existing electrophoretic equipment in conjunction with multisample applicator used with cellulose-acetate-matrix test paper. Using this method, approximately 20 to 25 samples can undergo electrophoresis in 5 to 6 minutes.

### **B73-10226 A CLOSED, DIGITAL TELEPHONE SYSTEM**

L. G. Monford, Jr.  
Aug. 1973  
**JSC-13912**

Digital system can accommodate sixteen or more telephone or data units and eight, simultaneous two-way conversations through only four interconnecting wires. It uses fewer circuit components, is not bulky or complex, and requires no central exchange control.

### **B73-10235 FLAMMABILITY CONTROL FOR ELECTRICAL CABLES AND CONNECTORS**

W. O. Wick (McDonnell Douglas Corp.) and D. L. Buckey (McDonnell Douglas Corp.)  
Aug. 1973  
**M-FS-21584**

Technique of covering fire-hazardous sections of electrical wiring with fireproof materials prevents fires from spreading in oxygen-enriched atmospheres and eliminates use of heavy metal enclosures. Materials used to cover potting on connectors and ground terminals are made from Teflon-coated Beta cloth and Fluorel, a nonflammable fully-saturated polymer.

### **B73-10236 MICROMINIATURIZED, BIOPOTENTIAL CONDITIONING SYSTEM (MBCS)**

N. Belasco, S. L. Pool, G. J. Cleveland (Lockheed Missiles & Space Co.), G. M. Loh (Lockheed Missiles & Space Co.), R. S. Luce (Lockheed Missiles & Space Co.), M. I. Lipanovich (Lockheed Missiles & Space Co.), H. L. Petersen (Lockheed Missiles & Space Co.), and D. W. Mangold (Boeing Co.)  
Aug. 1973

**JSC-14180**

Multichannel, medical monitoring system allows almost complete freedom of movement for subject during monitoring periods. System comprises monitoring unit (biobelt), transmission line, and data acquisition unit. Belt, made of polybenzimidazole fabric, is wrapped around individual's waist and held in place by overlapping sections of Velcro closure material.

### **B73-10243 LASER SYSTEM DETECTS TOWER DEFLECTIONS**

R. H. Fabik  
Nov. 1973  
**LEWIS-11870**

Continuously measure and record deflection of facility during testing. Facility deflections are then subtracted from shroud deflections during data reduction on computer. System is based on tracking light beam by using two-axis photo detector and feeding signals into X and Y servo system.

B73-10255

**A MAGNETICALLY FOCUSED IMAGE TUBE EMPLOYING AN OPAQUE PHOTOCATHODE**C. B. Johnson (Bendix Corp.) and K. L. Hallam (Bendix Corp.)  
Aug. 1973

GSFC-11602

Image converter has been developed which uses opaque photocathode for improved efficiency. Device is easier to fabricate than previous semi-transparent photocathode converters and uses compounds from Groups 3-5 that are responsive to wave-lengths between ultraviolet (approximately 100 nm) and near infrared region (approximately 1000 nm).

B73-10257

**FAST RECHARGE CIRCUIT FOR Q-SWITCHED LASERS**

R. L. Hansen (GTE Sylvania Inc.)

Aug. 1973

GSFC-11510

Cavity-dumped lasers employ electrooptic-effect cell to alternately block and release laser pulse. Cell requires high-speed switching circuit that can apply and remove high voltage. Solid-state circuit employs complementary transistor switches which can switch at rates greater than 5 kHz, eliminate warmup time, provide variable voltage wave-form, and allow polarity reversal.

B73-10261

**ELECTROSHOCK PROTECTION CIRCUIT**

H. Heskett (Martin Marietta Corp.), J. Meincer (Martin Marietta Corp.), and A. L. Inglis

Aug. 1973

JSC-14222

Circuit was developed to prevent accidental shock through electrodes used to test subjects as part of Skylab program. This circuit is placed between electrical apparatus and electrode that is attached to patient's body. Thus, patient is effectively protected from dangerous electrical shock that might be caused by failure in electrical apparatus.

B73-10267

**LASER VELOCIMETER FOR SIMULTANEOUS TWO-DIMENSIONAL VELOCITY MEASUREMENTS**

K. L. Orloff, G. R. Grant, and W. D. Gunter, Jr.

Jul. 1973

ARC-10637

Laser velocimeter provides simultaneous orthogonal measurements in manner which minimizes many problems attending prior systems, and allows spatial traversing of flowfield in order to obtain velocity profiles. Velocimeter permits rapid interrogation of unsteady flows where area of interest is of the order of one meter in extent and flow does not vary appreciably over time of about one second.

B73-10273

**TWO-CARRIER COMMAND MODULATION SYSTEM**

M. F. Easterling

Jun. 1973

NPO-11548

Two carriers transmit two high-power signals from single transmitter, each phase-modulated by subcarrier which, in turn, is modulated by data bits; switching between two carriers is alternated at high rate. Resulting composite signal is multiplied up to desired frequency and used to drive power amplifier which feeds transmitting antenna.

B73-10275

**TIME-SYNCHRONIZED VLF PHASE-TRACKING RECEIVER**

S. C. Ward

Jun. 1973

NPO-11600

Coded signals transmitted at very low frequencies by National Bureau of Standards via its radio facility WWVL contain both primary time and frequency information. Synchronization of local time with WWVL signal standard requires comparison of phase differences between transmitted signal and output of traveling atomic clock such as rubidium frequency standard.

B73-10277

**IMAGE DATA RATE CONVERTER: A CONCEPT**

F. C. Billingsley

Jun. 1973

NPO-11659

Establish data tracks on periphery of rotating drum and axially displace entire drum to place given track in alignment with either fixed or rotating read/record head. Accurate control of speed drum and rotating head can be accomplished by using separate synchronous motors driven by digitally-set oscillators to provide required difference in speed.

B73-10280

**PRESSURIZED LIGHTING SYSTEM**

G. A. Phlieger

Aug. 1973

KSC-10644

Safe lighting assembly has been constructed for hostile environments. Assembly is ventilated by inert gas to prolong life of lamps. Lighting assembly contains control box, number of lamps connected in parallel, several pilot lights, and ventilating circuit. Control box is provided with components for monitoring and controlling flow of ventilating gas through lamp assemblies.

B73-10281

**HIGH SPEED DIRECT-BINARY TO BINARY-CODED-DECIMAL CONVERTER AND SCALER**

P. C. Toole

Aug. 1973

KSC-10326

Telemetry (pulse code modulated) digital system usually sends binary numbers representing some parameter that is not value of binary number. Received binary number must be scaled and converted to binary coded decimal to operate readout device to display true value. Group of adders speed up binary number conversion and scaling in one operation.

B73-10282

**COSMIC DUST OR OTHER SIMILAR OUTER-SPACE PARTICLES LOCATION DETECTOR**

S. Aver

Aug. 1973

GSFC-11291

Cosmic dust may be serious radiation hazard to man and electronic equipment caught in its path. Dust detector uses two operational amplifiers and offers narrower areas for collection of cosmic dust. Detector provides excellent resolution as result of which recording of particle velocities as well as positions of their impact are more accurately determined.

B73-10285

**DIGITAL TV IMAGE ENHANCEMENT SYSTEM**

G. A. Biemson (GTE Sylvania)

Aug. 1973

GSFC-11256

Efficient, digital image-enhancement process has been developed for high-resolution slow-scan TV images. Scan converter is no longer subject to registration errors, which become more serious as resolution increases. To implement feedback image enhancement system, digital processing is used; otherwise there is excessive loss of image information, particularly in video delay lines.

B73-10288

**CIRCULARLY-POLARIZED MULTIBAND TELEMETRY TRACKING ANTENNA**

K. E. Woo

Jul. 1973

NPO-11264

Utilize coaxial horn feed to illuminate reflector; feed has inner horn for X-band, and outer horn for S-band. Tracking error signals for servo correction are derived from measurements of relative phase and relative amplitude between two modes.

B73-10289

**DATA MULTIPLEXER USING A TREE SWITCH**

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R. A. Easton and E. E. Hilbert  
Jul. 1973 See also B73-10290

### **NPO-11333**

Self-decoding FET-hybrid or integrated-circuit tree configuration uses minimum number of components and can be sequenced by clock or computer. Redundancy features can readily be incorporated into tree configuration; as tree grows in size and more sensors are included, percentage of parts that will affect given percentage of sensors steadily decreases.

### **B73-10290**

#### **FLEXIBLE FORMAT, COMPUTER ACCESSED TELEMETRY SYSTEM**

R. A. Easton and E. E. Hilbert  
Jul. 1973 See also B73-10289

### **NPO-11358**

With this system, it is possible to sample and generate two or more simultaneous formats; one can be transmitted to ground station in real time, and other is stored for later transmission. Sensor output comparison data, plus information to control format, compression algorithm, and allowable degree of sensor activity, are stored in memory.

### **B73-10291**

#### **HIGH-GAIN ANTENNA WITH SINGLY-CURVED REFLECTOR**

A. C. Ludwig  
Jul. 1973

### **NPO-11361**

Reflector collects energy over large region of space and focuses it toward small region where antenna feed is located. When incident energy is in form of plane wave, logical choice for shape of reflecting surface is paraboloid which converts plane wave into spherical wave that converges at a point.

### **B73-10293**

#### **IMPROVED MASERS FOR X-BAND AND Ku BAND**

R. C. Clauss and R. B. Quinn  
Jul. 1973

### **NPO-11437**

Slow-wave structure of traveling-wave maser utilizes comb system which is comprised of ruby on one side and alumina on other; alumina also supports isolator material. Radiation at pump frequency is coupled to ruby through shaped alumina strips. Contact between ruby bars and comb completes conductance path for heat transfer.

### **B73-10294**

#### **NUMERICAL INTERACTIVE CONTROLLER**

S. S. Brokl and A. I. Zygielbaum  
Jul. 1973 See also B73-10132

### **NPO-11497**

Device allows interaction of operator with data in computer central processor in order to shift frame of data in Cartesian coordinates and slew desired data into view. "Cursor generator program," in conjunction with device, provides light pen with sufficient resolving power to identify any particular set of coordinates with single-cell accuracy.

### **B73-10297**

#### **DIGITAL SERVO CONTROL OF RANDOM SOUND FIELDS**

R. B. Nakich (Time Zero Corp.)  
Jul. 1973 See also B73-10139

### **NPO-11623**

It is necessary to place number of sensors at different positions in sound field to determine actual sound intensities to which test object is subjected. It is possible to determine whether specification is being met adequately or exceeded. Since excitation is of random nature, signals are essentially coherent and it is impossible to obtain true average.

### **B73-10299**

#### **MULTIPLE-REFLECTION CONICAL MICROWAVE ANTENNA**

R. E. Oliver  
Jul. 1973 See also B73-10291

### **NPO-11661**

Conical-Gregorian antenna concept, using conical reflector,

promises excellent rf performance and offers potential advantages in areas of mechanical and structural design, surface measurement, and in furlability. Multiple reflection scheme between one or more subreflectors and main reflector is utilized. Subreflector can be reduced to as little as 0.1 the diameter of main reflector.

### **B73-10305**

#### **DYNAMIC POWER LOAD SIMULATOR**

K. P. Joncas (Avco Corp.), S. Birnbach (Avco Corp.), and M. Lambert, III (Avco Corp.)  
Aug. 1973 See also NASA-CR-115760

### **JSC-14285; JSC-14286**

Two independent models simulate dynamic and steady-state responses of electrical and electronic equipment under power load. One is resistance/capacitance/inductance network, and the other is variable resistance analog device. Resistance, inductance, and/or capacitance are selected by iterative process; time-domain response is compared with that of real equipment to select optimal values.

### **B73-10306**

#### **RF TO DIGITAL CONVERTER**

T. E. Flanders (GE) and G. Kosa (GE)  
Sep. 1973

### **JSC-14419**

Converter can be used for automatic spectrum analysis. Automatic gain amplifier digitizes RF amplitude, and amplifier gain is measured by binary counter. Amount of gain corresponds to signal level and is proportional to count in counter. System can be used to calculate AM and FM modulation index and other parameters of pulse-modulated FM waves.

### **B73-10308**

#### **INEXPENSIVE PROGRAMMABLE COMPUTER CLOCK**

J. E. Vrancik  
Dec. 1973 See also NASA-TM-X-2500

### **LEWIS-11797**

Clock's computer interface accepts pulses from computer (computer commands) and translates them into control signals for clock, and vice versa. Clock is preset by computer to a fixed number of time pulses, and then started. After fixed number of time pulses has occurred, clock reads pulse (via interface) to computer and stops.

### **B73-10313**

#### **EXTENDED RANGE HARMONIC FILTER**

H. Jankowski (GE), A. J. Geia (GE), and C. C. Allen (GE)  
Dec. 1973 See also NASA-CR-120927

### **LEWIS-12064**

Two types of filters, leaky-wall and open-guide, are combined into single component. Combination gives 10 db or greater additional attenuation to fourth and higher harmonics, at expense of increasing loss of fundamental frequency by perhaps 0.05 to 0.08 db. Filter is applicable to all high power microwave transmitters, but is especially desirable for satellite transmitters.

### **B73-10317**

#### **PEAK-HOLDING CIRCUIT FOR EXTREMELY NARROW PULSES**

R. W. O'Neill (Lockheed Aircraft Corp.)  
Sep. 1973

### **JSC-14129**

Circuit was developed which can stretch pulses in 50- to 3200-ns range to make them acceptable for pulse-height analyzers. Circuit uses high-speed wide-band amplifier, does not need excessive frequency compensation, and can handle pulses one-tenth of width normally required by pulse analyzers.

### **B73-10318**

#### **SCANNING BEACON LOCATOR SYSTEM: A CONCEPT**

P. W. Shores  
Sep. 1973

### **JSC-12593**

If aircraft and ships are equipped with beacons capable of communicating with satellites, rescue efforts may speed up significantly. In event of disaster, beacons can transmit distress

message to satellite which, in turn, will relay message to nearest rescue center, indicating distress location.

**B73-10321**  
**ELECTRO-OPTICAL DEVICE FOR MONITORING WIRE SIZE**  
 E. E. Burcher and W. L. Kelly, IV  
 Oct. 1973  
**LANGLEY-11358**

Device recognizes variations in wire size and is being used during computer memory-plane fabrication. Decrease in wire diameter, due to stretching, permits removal of wire from memory-plant mold. Monitoring provides means of detecting imperfect wire and permits fabrication of computer memory plane to be stopped prior to its insertion into mold.

**B73-10323**  
**SYNCHRONOUS TEN-MEGABIT BIPHASE DETECTOR**  
 L. Balliet (IBM)  
 Oct. 1973  
**M-FS-22546**

Synchronous phase-lock-loop detector accepts distorted input and generates jitter-free clock. Data-detection circuitry takes advantage of this clock and employs integrate-and-dump decision circuit to provide near-theoretically ideal data decoding.

**B73-10327**  
**LASER SCANNER FOR TESTING SEMICONDUCTOR CHIPS**  
 T. C. Hall (Hughes Aircraft Co.)  
 Oct. 1973  
**M-FS-22693**

Individual "fingerprint" signals are produced when system photoexcites chips. "Fingerprints" are analyzed for characteristics associated with defects, including many not visible to the naked eye. Electromagnetic radiation photogenerates free electrons and holes in semiconductor chip. These carriers produce electrical signals at terminals. Signals vary depending on what defects are present.

**B73-10331**  
**ISOLATED OUTPUT FOR CLASS-D dc AMPLIFIERS**  
 M. A. Honnel (Auburn Univ.) and J. K. Newell (Auburn Univ.)  
 Sep. 1973  
**M-FS-21616**

Transformer-coupled output stage is used with pulse-width modulated class-D dc amplifiers. Circuit is comprised of two channels corresponding to negative and positive input signals. Amplitude of secondary-current triangular pulse is function of duration of driving pulse. Therefore, circuit converts pulse-width modulated driving signal to pulse-amplitude modulated signal.

**B73-10334**  
**ACTIVE TUNING CIRCUIT**  
 L. L. Kleinberg  
 Oct. 1973  
**GSFC-11340**

Low-cost, inductorless, high Q active-tuning circuit can be made by coupling pair of transistors and their supporting circuitry to take advantage of frequency dependent energy storage effects. Circuit may be manufactured by standard micro-electronic techniques; has very low noise factor; and input-output matching networks are not necessary.

**B73-10337**  
**DIGITAL SERVO CONTROLLER BEHAVES LIKE SYNCHRO**  
 F. Byrne  
 Oct. 1973  
**KSC-10769**

Encoder has been used for years to measure accurately positional parameters of controlled devices with very high accuracy and reliability. Digital control system has been designed using digital shaft angle encoders.

**B73-10342**  
**SINGLE-CHANNEL DIGITAL COMMAND-DETECTION SYSTEM**  
 C. C. Carl, L. A. Couvillon, R. M. Goldstein, E. C. Posner, and R.

R. Green  
 Aug. 1973  
**NPO-11302**

System, fabricated of highly-reliable digital logic elements, operates on binary pulse-code-modulated signals and derives internal synchronization from data signal. All-digital implementation of detector develops synchronization from data signal by computer cross-correlation of command modulation signal with its expected forms in sequence and adjusts detector phases in accordance with correlation peaks.

**B73-10343**  
**AUTOMATIC CARRIER ACQUISITION SYSTEM FOR PHASE-LOCK-LOOP RECEIVERS**  
 R. C. Bunce  
 Aug. 1973  
**NPO-11628**

Programmable oscillator and zero-beat detector acquires phase-lock of carrier by frequency scanning. Generation of high-level dc pulse at instant of zero crossing provides positive trigger for decision gate to stop search and close loop for phase-coherent tracking.

**B73-10345**  
**IMPROVED NOISE-ADDING RADIOMETER FOR MICROWAVE RECEIVERS**  
 P. D. Batelaan, C. T. Stelzried, and R. M. Goldstein  
 Aug. 1973  
**NPO-11706**

Use of input switch and noise reference standard is avoided by using noise-adding technique. Excess noise from solid state noise-diode is coupled into receiver through directional coupler and square-wave modulated at low rate. High sensitivity receivers for radioastronomy applications are utilized with greater confidence in stability of radiometer.

**B73-10352**  
**SAFETY MONITORING SYSTEM FOR RADIOISOTOPE THERMOELECTRIC GENERATORS**  
 A. Zoltan  
 Aug. 1973  
**NPO-13285**

System alerts personnel of hazards which may develop while they are performing tests on radioisotope thermoelectric generator (RTG). Remedial action is initiated to minimize damage. Five operating conditions are monitored: hot junction temperature, cold junction temperature, thermal shroud coolant flow, vacuum in test chamber, and alpha radiation.

**B73-10353**  
**LASER ENERGY CONVERTED INTO ELECTRIC POWER**  
 K. Shimada  
 Aug. 1973  
**NPO-13308**

Apparatus verifies concepts of converting laser energy directly into electric energy. Mirror, placed in beam and inclined at angle to it, directs small amount of incident radiation to monitor which establishes precise power levels and other beam characteristics. Second mirror and condensing lens direct bulk of laser energy into laser plasmadynamic converter.

**B73-10354**  
**PROCESSOR FOR HIGH-DENSITY DIGITAL TAPE-RECORDED SIGNALS**  
 J. C. Ashlock  
 Aug. 1973  
**NPO-11399**

Linear filter and detection theory can bear on problem of reconstructing recorded bit stream. Problem can be taken from realm of nonlinear problems even though basic record process is still recognized as highly nonlinear. Digital tape recorder can be modeled as particular type of linear communication channel with intersymbol interference.

**B73-10355**  
**DIGITAL SLOPE-THRESHOLD DATA COMPRESSOR**

## 02 ELECTRONIC/ELECTRICAL SYSTEMS

T. O. Anderson  
Aug. 1973  
NPO-11630

Slope-threshold compression scheme for telemetered video data is efficient, and its principle of operation is as follows: when slope of raw data exceeds threshold decision reference, previous sample is transmitted. All-digital design is more economical than analog system. It exhibits well-defined accuracy, provides unlimited storage time, and is convenient and reliable.

**B73-10361**  
**AUTOMATIC FOCUS CONTROL FOR FACSIMILE CAMERA**  
A. R. Sinclair, S. J. Katzberg, and E. E. Burcher  
Oct. 1973

**LANGLEY-11213**

Focus control performs function of automatically focusing facsimile camera throughout object field being scanned. It does this by determining and adjusting focus of imaging sensor accordingly. Since facsimile camera images a scene by scanning discrete strips, it is possible to have entire three-dimensional scene in perfect focus at point of imaging by use of focus control.

**B73-10365**  
**PULSE STRETCHER FOR NARROW PULSES**  
R. S. Lindsey, Jr. (Lockheed Electronics Co.)  
Oct. 1973

**JSC-14130**

Pulse stretching circuit can linearly stretch pulses as narrow as 50 nanoseconds and block incoming pulses following accepted input pulse until processing has been completed. It also removes baseline distortion by being completely direct coupled and provides monitor output which measures true number of input events that exceed predetermined threshold.

**B73-10367**  
**PROGRAMMABLE RANDOM INTERVAL GENERATOR**  
R. S. Lindsey, Jr. (Lockheed Electronics Co.)  
Oct. 1973

**JSC-14131**

Random pulse generator can supply constant-amplitude randomly distributed pulses with average rate ranging from a few counts per second to more than one million counts per second. Generator requires no high-voltage power supply or any special thermal cooling apparatus. Device is uniquely versatile and provides wide dynamic range of operation.

**B73-10370**  
**ALPHANUMERIC CHARACTER GENERATOR FOR OSCILLOSCOPE**  
D. C. Lockerson and R. E. Boston  
Oct. 1973

**GSFC-11582**

Compact portable alphanumeric display device can be used with any general-purpose externally-triggered oscilloscope without need for Z-axis modulation. Factors limiting size of display are: output line capacitance, read-only memory speed, and persistence of cathode-ray-tube.

**B73-10382**  
**DATA COMPRESSION BY A DECREASING SLOPE-THRESHOLD TEST**

L. Kleinrock

Sep. 1973

**NPO-10769**

Resolution can be obtained at large compression ratios with method for selecting data points for transmission by telemetry in television compressed-data system. Test slope of raw data stream and compare it to symmetric pair of decreasing thresholds. When either threshold is exceeded, data are sampled and transmitted; thresholds are reset, and test begins again.

**B73-10389**  
**METER CIRCUIT FOR TUNING RF AMPLIFIERS**  
J. E. Longthorne  
Sep. 1973

**NPO-11865**

Circuit computes and indicates efficiency of RF amplifier as inputs and other parameters are varied. Voltage drop across internal resistance of ammeter is amplified by operational amplifier and applied to one multiplier input. Other input is obtained through two resistors from positive terminal of power supply.

**B73-10392**  
**ANKYLOSIS-STABILIZED OSCILLATOR**

L. L. Kleinberg

Oct. 1973

**GSFC-11513**

One feature of this mechanism is reduction of self-modulation, a source of harmonic generation. Since amplitude of oscillation is large, cutoff frequency is varied in proportion to the amplitude and frequency of oscillation. While one transistor is experiencing a positive alteration, the other is experiencing a negative alteration. Net effect is reduction in self-modulation.

**B73-10401**  
**VECTORCARDIOGRAM**  
M. Costello (Martin Marietta Corp.)  
Nov. 1973

**JSC-14427**

System measures electrocardiographic potentials to produce precise quantitative measurement of changes that occur in individual's cardiac function. System is rugged, built to sustain extremes of temperature, pressure, humidity, shock, and vibration. It can also be used in pure oxygen environment without danger of combustion.

**B73-10408**  
**LOGIC CONTROLLED SOLID STATE SWITCHGEAR**  
E. Buchanan (Martin Marietta Corp.) and D. Waddington  
Dec. 1973 See also NASA-CR-121140

**LEWIS-12044**

Logic controlled solid state circuit breakers and power transfer switches have been designed and built to demonstrate their use for 270 V dc power systems. This switchgear provides remote operation, automatic current level, and operates several orders of magnitude faster with much greater accuracy of response than conventional switchgear.

**B73-10410**  
**COMBINED DIPLEXER AND HARMONIC FILTER**  
C. C. Allen (GE)

Dec. 1973 See also NASA-CR-120927

**LEWIS-12059**

By using two directional filters having circular waveguide filter cavities, diplexing and harmonic filtering functions can be combined into a more compact integrated waveguide assembly. Device is filter which passes power within its pass band limits, but also has a directional characteristic so power transmitted into two-port output waveguide will travel in only one direction.

**B73-10411**  
**LOW-COST CLEARANCE INDICATOR FOR HIGH SPEED TURBOMACHINERY**

R. C. Evans, D. J. Lesco, A. B. McLachlan, and F. A. Dellatorre  
Dec. 1973

**LEWIS-12128**

System consists of hermetically sealed capacitance probe, compact electronic driver, power supply, and oscilloscope and/or voltmeter for readout. System requires no mechanical connection to the rotating parts of turbomachinery, and does not disrupt rotor mainstream flow pattern. It can be effectively used in other applications to measure dynamic clearances between moving and stationary parts.

**B73-10426**  
**FLARED-CONE TURNSTILE ANTENNA**  
T. G. Gavrilis (Martin Marietta Corp.) and D. J. Bottoms (Martin Marietta Corp.)  
Dec. 1973

**LANGLEY-10970**

Antenna could be used in any application where increased

ultrahigh frequency beamwidth is desired. Possible applications include aircraft, communication links, ground omniranges, and satellites. It is also possible that antenna could be adapted for use in television transmission and receiving.

**B73-10426**  
**RF ANTENNA-PATTERN VISUAL AIDS FOR FIELD USE**  
 J. H. Williams  
 Dec. 1973  
**NPO-10821**

Series of plots must be made of antenna pattern on polar-coordinate sheet depicting vertical planes. Separate sheets are plotted depicting antenna patterns in vertical plane at azimuth positions. After all polar plots are drawn, they are labeled according to their azimuthal positions. Transparencies are then stiffened with regular wire, cardboard, or molded plastic.

**B73-10431**  
**TELEVISION NOISE-REDUCTION DEVICE**  
 J. C. Stamps and B. L. Gordon (Taft Broadcasting Corp.)  
 Dec. 1973  
**JSC-12607**

System greatly improves signal-to-noise ratio with little or no loss in picture resolution. By storage of luminance component, which is summed with chrominance component, system performs mathematical integration of basically-repetitive television signals. Integration of signals over interval of their repetition causes little change in original signals and eliminates random noise.

**B73-10449**  
**DATA-MATCHED FILTER**  
 N. R. Scheinberg (RCA) and D. Hampel (RCA)  
 Feb. 1974  
**JSC-14264**

After amplification and normalization, incoming data bits are fed, alternately, to pair of integrators. While one integrator is operating, content of other is on hold, sample, and dump. Clock derived in bit-timing extractor times and controls integrators. Frequency of clock is one-half data rate.

**B73-10451**  
**HIGH-POWER MICROSTRIP SWITCH**  
 S. D. Choi  
 Mar. 1974  
**NPO-11965**

Switch, which uses only two p-i-n diodes on microstrip substrate, has been developed for application in spacecraft radio systems. Switch features improved power drain, weight, volume, magnetic cleanliness, and reliability, over currently-used circulator and electromechanical switches.

**B73-10452**  
**MEANS FOR MAPPING RADIATED FIELDS AND FOR MEASURING DIFFERENTIAL MOVEMENT OF ANTENNA ELEMENTS**  
 C. C. Lundy  
 Jan. 1974  
**NPO-13053**

Null seeking system uses two transponders located at selected points on dish to detect phase-front of received signal. One signal line has continuously variable phase shifter driven by reversible stepmotor. Each of two transponders on dish is a dipole with mixer crystal between elements. Crystal is driven, in turn, by 181.6MHz signal carried by miniature coaxial cable.

**B73-10454**  
**PROBES FOR MEASURING NOISE CURRENT IN AN ELECTRONIC CABLE**  
 C. C. Lundy  
 Feb. 1974  
**NPO-13123**

Electromagnetic interference in deep-space network receiver is often caused by stray coupling from power lines. These stray signals create potential differences between ground terminals, which leads to excessive noise in receiver circuits. Pair of probes detect and measure noise currents in conductors.

**B73-10460**  
**COMBINED SUN-ACQUISITION AND SUN GATE-SENSOR SYSTEM FOR SPACECRAFT ATTITUDE CONTROL**  
 L. F. Schmidt  
 Jan. 1974  
**NPO-13051**

Arrangement combines acquisition and gate functions and reduces sensitivity so that attitude control is effective regardless of changes in solar intensity. There are five photoconductive detectors all electrically interconnected. Detectors are so positioned that, regardless of spacecraft orientation at any instant of interest, at least one detector is illuminated.

**B73-10467**  
**VERSATILE, ANALOG-TO-DIGITAL, POWER-REGULATOR CONTROLLER**  
 W. T. McLyman  
 Mar. 1974  
**NPO-13178**

Power controller uses digital techniques to vary duty ratio of switching-type power regulators. Duty ratio is adjusted by comparing error signal with ramp voltage signal. As compared to previously-used switching regulators, controller uses fewer components and no magnetics and is readily adaptable to thick-film technology.

**B73-10479**  
**INPUT-OUTPUT, EXPANDABLE-PARITY NETWORK**  
 J. F. McKevitt, III (Hughes Aircraft Co.)  
 Mar. 1974  
**HQ-10728**

Large-scale integrated circuit generates and checks parity of four eight-bit registers. In addition, circuit will indicate by output signal whether parity error exists. Circuit can also generate or check parity of words up to 32 bits. This is done by making appropriate internal wiring connections on the large-scale integrated chip.

**B73-10480**  
**PSEUDOTACHOMETER FOR MOBILE METABOLIC ANALYZER**  
 J. R. Currie  
 Mar. 1974  
**M-FS-22909**

Metabolic analyzer determines a patient's walking or ambulation speed and simultaneously measures his metabolic parameters. Analyzer is designed to move at some preselected human ambulation speed. During test, patient is connected to system and follows analyzer closely while his metabolic data is being monitored.

**B73-10486**  
**RECHARGEABLE, SILVER-ZINC BATTERY CONDITIONER/MONITOR UNIT AND STATE-OF-CHARGE INDICATOR**  
 C. E. Thomas (Chrysler Corp.)  
 Mar. 1974  
**M-FS-22835**

Unit automatically charges batteries to desired state-of-charge levels, monitors functional battery parameter data both on meters and printer, and automatically activates alarm in event of battery malfunctions. Unit consists of state-of-charge indicator panel, control panel, monitor panel, power panel, charging-current power supply, and load panel.

**B73-10487**  
**BINARY-SELECTABLE DETECTOR HOLDOFF CIRCUIT**  
 K. A. Kadrmas  
 Mar. 1974  
**M-FS-22898**

High-speed switching circuit protects detectors from sudden, extremely-intense backscattered radiation that results from short-range atmospheric dust layers, or low-level clouds, entering laser/radar field of view. Function of circuit is to provide computer-controlled switching of photodiode detector, preamplifier power-supply voltages, in approximately 10 nanoseconds.

## 02 ELECTRONIC/ELECTRICAL SYSTEMS

**B73-10491**

### **SUBMINIATURE MICROPOWER DIGITAL RECORDER**

R. M. Goodman (The Franklin Inst. Res. Labs.) and R. W. Pitman (The Franklin Inst. Res. Labs.)

Dec. 1973

**ARC-10746**

High-density digital data, collected periodically or randomly from multiplicity of sensors, are recorded by subminiature recorder. Magnetic recording head is energized with suitable pulsatile signals to reverse polarization on magnetically-sensitive tape while tape is immobilized at recording head. Prior to next recording, set tape so new area of tape is at recording head.

**B73-10499**

### **STEREOSCOPIC TELEVISION SYSTEM**

J. L. Jones

Dec. 1973

**ARC-10160**

In this system, both left and right optical images pass through same set of optical lenses and same TV transmission and receiving systems. Transmitted stereo images are of high quality because differences in image tone and gray scales, disparities in relative focusing and magnification, and nonsimilar distortions produced by electrical and optical imperfections are minimized.

**B73-10500**

### **IMPROVED 135.6-MHz ANTENNA**

E. H. Gross

Dec. 1973

**ARC-10743**

Commercially available four-element array can be readily modified to receive 135.6-MHz signals. Directivity of each of the four elements is improved by lengthening them, repositioning feed elements, and changing total element-to-element spacing in both planes.

**B73-10506**

### **TRUE AIRSPEED MEASURED BY AIRBORNE LASER DOPPLER VELOCIMETER**

R. Munoz, H. W. Mocker (Honeywell Inc.), and L. E. Koehler (Honeywell Inc.)

Dec. 1973

**ARC-10763**

Velocimeter utilizing carbon dioxide laser measures true airspeed of aircraft. Results of flight tests indicate that clear-weather airspeeds can be measured with accuracy better than 0.1% at altitudes up to 3000 meters; measurements can be made at much greater altitudes in cloudy or turbid air.

**B73-10510**

### **AUTOMATIC PCM GUARD-BAND SELECTOR AND CALIBRATOR**

T. T. Noda (New Mexico State Univ.)

Mar. 1974

**KSC-10812**

Automatic method for selection of proper guard band eliminates human error and speeds up calibration process. There is also an option which allows a single channel to be calibrated, independently of other channels. Entire system is designed on 3- by 4-inch printed-circuit cards and may be used with any pulse code modulation system.

**B73-10511**

### **DIGITAL TRANSMITTER FOR DATA BUS COMMUNICATIONS SYSTEM**

G. E. Proch (Lockheed Electronics Co.)

Mar. 1974

**JSC-14558**

Digital transmitter designed for Manchester coded signals (and all signals with ac waveforms) generated at a rate of one megabit per second includes efficient output isolation circuit. Transmitter consists of logic control section, amplifier, and output isolation section. Output isolation circuit provides dynamic impedance at terminals as function of amplifier output level.

**B73-10513**

### **ISOLATED TRANSFER OF ANALOG SIGNALS**

T. Bezdak (Martin Marietta Corp.)

Mar. 1974

**LANGLEY-11312**

Technique transfers analog signal levels across high isolation boundary without circuit performance being affected by magnetizing reactance or leakage inductance. Transfers of analog information across isolated boundary are made by interrupting signal flow, with switch, in such a manner as to produce alternating signal which is applied to transformer.

**B73-10514**

### **EYE-CONTROLLED "TELETYPEWRITER"**

J. D. Holt, L. D. Leavitt, and H. D. Bowen (LTV Aerospace Corp.)

Mar. 1974

**LANGLEY-11564**

Oculometer provides dynamic measurement of subject's look direction, and its outputs can be used to generate visual display of his look pattern and/or to cause equipment operation associated with his lookpoint at given times. Measured eye-direction information could be used as control input at man/machine interface.

**B73-10525**

### **VARIABLE-FREQUENCY INVERTER CONTROLS TORQUE, SPEED, AND BRAKING IN ac INDUCTION MOTORS**

F. J. Nola

Mar. 1974

**M-FS-22088**

Dc to ac inverter provides optimum frequency and voltage to ac induction motor, in response to different motor-load and speed requirements. Inverter varies slip frequency of motor in proportion to required torque. Inverter protects motor from high current surges, controls negative slip to apply braking, and returns energy stored in momentum of load to dc power source.

## 03 PHYSICAL SCIENCES

**B73-10009**

### **VIDEO ENHANCEMENT OF X-RAY AND NEUTRON RADIOGRAPHS**

A. Vary

Mar. 1973

**LEWIS-11944**

System was devised for displaying radiographs on television screen and enhancing fine detail in picture. System uses analog-computer circuits to process television signal from low-noise television camera. Enhanced images are displayed in black and white and can be controlled to vary degree of enhancement and magnification of details in either radiographic transparencies or opaque photographs.

**B73-10016**

### **CONTINUOUS CATALYTIC DECOMPOSITION OF METHANE**

J. E. Clifford (Battelle-Columbus Labs.), L. J. Hillenbrand (Battelle-Columbus Labs.), B. C. Kim (Battelle-Columbus Labs.), E. S. Kolic (Battelle-Columbus Labs.), and J. Zupan (Battelle-Columbus Labs.)

Jan. 1973 See also NASA-CR-1662

**ARC-10339**

Water is conserved by employing sequence of reactions whereby 75% of methane from Sabatier reaction is decomposed to solid carbon and hydrogen; hydrogen is then separated from residual methane and utilized in usual Sabatier reaction to reduce remaining metabolic carbon dioxide.

B73-10017

**HIGH-TEMPERATURE-RADIATION ANALYZER**

R. P. Farwell (Barnes Engineering Co.)

Jan. 1973

ARC-10666

Six-channel radiometer with three ultraviolet detection channels measures temperatures at 2-millisecond intervals. One infrared channel measures total radiation, and two infrared channels measure radiation in discrete spectral intervals at rate of 40 intervals per second. Analyzer consists of optical and electrical system.

B73-10018

**DETECTION OF NITRIC OXIDE POLLUTION**

C. Chackerian, Jr. and M. F. Weisbach

Jan. 1973

ARC-10709

Studies of absorption spectra enhancement of certain atomic and molecular species inserter in dye-laser cavities have indicated that nitric oxide can be determined at low concentrations. Absorption coefficient of small amounts of nitric oxide in intra-laser-cavity absorption cell containing helium is enhanced by more than two orders of magnitude.

B73-10025

**APPARATUS FOR MEASURING ELECTRICAL PROPERTIES OF MATERIALS**

V. Hadek

Jan. 1973

NPO-11749

Resistance of sample is measured with aid of usual electrical test instruments applied to electrical contacts provided at ram and anvil assemblies. Temperature differential is established between ram and anvil for measurement of Seebeck coefficient. Voltage generated across sample is detected at electrical contacts.

B73-10027

**TWO NEW METHODS TO INCREASE THE CONTRAST OF TRACK-ETCH NEUTRON RADIOGRAPHS**

J. Morley

Mar. 1973 See also NASA-TM-X-67947

LEWIS-11893

In one method, fluorescent dye is deposited into tracks of radiograph and viewed under ultraviolet light. In second method, track-etch radiograph is placed between crossed polaroid filters, exposed to diffused light and resulting image is projected onto photographic film.

B73-10031

**EXPERIMENTAL VERIFICATION OF COMPUTER SPRAY-COMBUSTION MODELS**

W. H. Nurick (Rocketdyne/N. Am. Rockwell Corp.), R. M. Clayton, and J. H. Rupe

Feb. 1973 See also NASA-CR-114479

ARC-10689

Analytical model formulation, representing performance of spray-combustion device, is based on understanding of atomization, mixing, vaporization, and combustion which occurs in device. Report lists results of correlations of computed values with values obtained from experiments with rocket combustor. Technique offers excellent method for evaluating validity and ranges of applicability of combustion models.

B73-10050

**OPTICAL MONITORING SYSTEM**

J. T. Nev (Gen. Dynamics Corp.), E. H. Wrench (Gen. Dynamics Corp.), M. G. Fox (Gen. Dynamics Corp.), and H. Lave (Gen. Dynamics Corp.)

Feb. 1973

M-FS-21692

Instrument can measure optical transmission, reflectance, and scattering. This information can be used to identify changes in optical properties or deviations from required optical standards. Device consists of monochromatic source, photo detector, transfer mirror, and hemispherical. System might be used to measure optical properties of thin film.

B73-10068

**SUSPENSION OF OBJECTS IN MAGNETIC AND ELECTRIC FIELDS**

L. S. Wiik (MIT)

Mar. 1973

JSC-14170

Device has improved suspension efficiency by simulating characteristics of diamagnetic materials. Pseudodiamagnetic device suspended magnet in magnetic field at rate of 232 Kg/W. Suspension in magnetic field can be produced in two ways: magnetic source can be stationary and pseudodiamagnetic device suspended or vice versa.

B73-10075

**VIBRATION MEASUREMENT BY PULSE DIFFERENTIAL HOLOGRAPHIC INTERFEROMETRY**

D. A. Evensen (TRW, Inc.) and R. Aprahamian (TRW, Inc.)

Mar. 1973 See also NASA-CR-2028

LANGLEY-11092

Technique measures structural deformation of materials subjected to wide range of temperatures and other environmental conditions. Effects of convection currents are eliminated by operating a pulsed laser in double pulse mode that exposes hologram twice in quick succession.

B73-10086

**HOLOGRAPHIC TESTING WITH A DOUBLE REFERENCE BEAM**

F. H. Stuckenberg (Rockwell Intern. Corp.)

Mar. 1973

JSC-17969

Image of unstressed object is taken with reflected beam and one reference beam. Object is then stressed and second (double) exposure is made. Developed film plate provides double exposure hologram that can be projected by simultaneous illumination with both reference beams. Appearance of multiple images may be eliminated while manipulating fringe patterns.

B73-10095

**A NEW OPTICAL RECORDING MEDIUM**

H. Aronson (Isomet Corp.) and G. M. Loiacono (Isomet Corp.)

Mar. 1973

M-FS-22348

Method has been developed for doping lithium niobate crystals with transition metal to increase rate at which crystal can record optical data. Discovery may facilitate development of system for analog storage of TV frames, printed pages, photographs, and other visual information.

B73-10105

**THERMAL CONTACT RESISTANCE IN A NON-IDEAL JOINT**

R. T. Roca (MIT) and B. B. Mikic (MIT)

May 1973

M-FS-21775

Analysis has been conducted to determine thermal contact resistance at interface of two heat conductors and effect of roughness of mating surfaces on pressure distribution. Investigation reveals how heat transfer resistance may be decreased or increased by changing surface properties of particular interface being considered.

B73-10116

**FAST-NEUTRON SPECTROMETER DEVELOPMENTS**

R. B. Moler (IIT Res. Inst.), W. E. Zagotta (IIT Res. Inst.), and S. I. Baker (IIT Res. Inst.)

Jun. 1973

M-FS-22279

Li6 sandwich-type neutron spectrometer is equipped with proportional counter for particle identification. System uses current-sensitive preamplifiers to minimize pile-up of gamma-ray and particle pulses.

B73-10130

**MONITOR FOR PHYSICAL PROPERTY CHANGES IN SOLID PROPELLANTS**

R. E. Black, Jr. (Thiokol Chem. Corp. Elkton Div.)

## 03 PHYSICAL SCIENCES

Mar. 1973 See also NASA-CR-114456  
**ARC-10702**

Specially designed sensor is attached to or imbedded in propellant. When sensor is driven into vibration, it moves with a phase lag directly proportional to internal friction or loss coefficient. Resonance frequency of the system is related to Young's modulus. Modulus or internal friction can be monitored over long period of time.

**B73-10131**  
**LIGHT-DIRECTION SENSOR BASED ON BIREFRINGENCY**  
A. R. Johnston  
Mar. 1973  
**NPO-11201**

Optical system consisting of polarizer, analyzer, quarterwave retarder converts incident light beam to one which has an intensity related to the extent the incident beam is off axis.

**B73-10133**  
**GAS-OPERATED ACTUATOR: A CONCEPT**  
P. G. Simmonds  
Mar. 1973  
**NPO-11369**

Recyclable actuator does depend on valves for its operation. Palladium cathode tube in electrochemical cell is used to generate hydrogen by electrolysis. Hydrogen pressure generated inside tube causes expansion of bellows, which raises load. Bellows can be retracted by reversing electrical connections to cell electrodes.

**B73-10137**  
**ROCKET PLUME PROPERTIES MEASURED IN SPACE SIMULATORS**  
J. B. Stephens and J. G. Herrera  
Mar. 1973 See also B72-10243  
**NPO-11608**

Molecular sink facility and 25-foot space simulator have been used to distinguish nature of exhaust plumes from nozzles with relatively large internal boundary layer flow. Plume density has been measured by electron beam/photomultiplier system.

**B73-10140**  
**MICROWAVE EMISSION FROM GRANULAR SILICATES**  
J. E. Conel  
Mar. 1973 See also JPL-TM-33-458  
**NPO-11702**

Experimental finding is that mass absorption coefficient is independent of frequency but highly dependent on moisture content; effective conductivity increases with frequency, and low tangent is independent of frequency. Computed values of electrical properties are in rough numerical agreement with extrapolated laboratory values on other silicate materials.

**B73-10143**  
**IMPROVED TECHNIQUE FOR INSPECTION OF PLANAR SURFACES BY MICROSCOPY AND INTERFEROMETRY**  
D. S. Doubt  
Mar. 1973  
**NPO-11893**

Incident white light and ordinary interferometer attachment provide images that differ in color according to relative heights of planar surfaces. With aid of technique, it is possible to perceive buried layers, such as diffused collectors, as well as discover defects in buried layers.

**B73-10155**  
**LASER ADDRESSED HOLOGRAPHIC MEMORY SYSTEM**  
R. A. Gange (RCA), E. M. Wagle (RCA), and C. C. Steinmetz (RCA)  
May 1973 See also B73-10166  
**M-FS-22565**

Holographic recall and storage system uses red-lipid micro-crystalline wax as storage medium. When laser beam strikes wax, its energy heats point of incidence enough to pass wax through transition temperature. Holograph image can then be written or erased in softened wax.

**B73-10158**  
**A FLEXIBLE ALL-TEMPERATURE PRESSURE VESSEL**  
M. L. Strangeland (Rockwell Intern. Corp.)  
May 1973  
**M-FS-19196**

By interrupting lines of stress with convolutions, structure can be designed to contain pressure, operate at cryogenic and high temperatures, and provide flexibility necessary for repetitive cycles of parallel-offset shear translation.

**B73-10163**  
**REDUCED PREPARATION TIME FOR THERMAL VACUUM CHAMBER TESTS**  
T. W. Tysor (Rockwell Intern. Corp.)  
May 1973  
**M-FS-24171**

Insulation system of test chamber will reach thermal equilibrium more quickly when it is gassy and least efficient than when evacuated and most efficient.

**B73-10175**  
**Q-SWITCHED, CAVITY-DUMPED, MODE-LOCKED LASER**  
W. Fountain (GTE Sylvania)  
Jun. 1973  
**GSFC-11509**

Continuous-wave laser can achieve higher rate of emission through Q-switching. Technique keeps Q, energy storage rating, of laser cavity at low value while ion population inversion is being built up. Then Q is suddenly switched to high value just before instability occurs.

**B73-10176**  
**ROCKET BORNE INSTRUMENT TO MEASURE ELECTRIC FIELDS INSIDE ELECTRIFIED CLOUDS**  
L. H. Ruhnke (NOAA)  
Jun. 1973  
**KSC-10730**

Simple electric field measuring system is mounted on small rocket and consists of two voltage probes, one extending from nose and other on tail fin. Electric field through which rocket passes is determined by potential difference between probes.

**B73-10181**  
**ION MASKING IMPROVES RESOLUTION IN QUADRUPOLE MASS SPECTROMETERS**  
N. Ierokomos (Perkin-Elmer Corp.) and M. R. Ruecker (Perkin-Elmer Corp.)  
Jun. 1973 See also NASA-CR-115781  
**GSFC-11406**

Mass spectrometers analyze molecular composition by determining mass-to-charge ratio of ion fragments of molecules. Study adds significantly to quantitative understanding of quadrupole mass filter. It includes development of quantitative theory of ion oscillations, computer analysis of ion behavior, and identification of determining factors in peak tail size.

**B73-10182**  
**DESIGN AND FABRICATION OF AN EXPERIMENTAL IMAGE FORMING LIGHT MODULATOR**  
R. G. Shackelford (Georgia Inst. of Tech.) and J. R. Walsh, Jr. (Georgia Inst. of Tech.)  
Jun. 1973  
**M-FS-22547**

Image forming light modulator transforms electrical signal representation of two dimensional image into optical transparency. All major assemblies are easily demounted for convenience in adapting modulator to other operating modes with different modulation-media. High-speed vacuum pump is incorporated into modulator housing to help reach required operating pressure.

**B73-10192**  
**BALLOON-BORNE PACKAGE TEMPERATURE CONTROL-  
LER**  
M. Schach and J. T. Triolo  
Jun. 1973  
**GSFC-11620**

Simple, inexpensive, lightweight enclosure traps upward long wave radiation of earth while reflecting harsh solar radiation in upper atmosphere. It warms enclosed instruments in cold regions and protects them from overheating during the day. Device can be attached to balloon system without any changes in experimental design.

**B73-10206**

**ANGULAR MAGNETIC FIELD BEAM IMPROVES EFFICIENCY IN KLYSTRONS AND TRAVELING WAVE TUBES**  
W. Neugebauer (GE)

Jun. 1973 See also NASA-CR-12114

**LEWIS-11610**

Special lens shaping allows variation of focusing strength with radius. Lens can be either converging or diverging depending on charge of particles and direction of angular magnetic field. There is potential use for lens in particle analyzers, electron beam welding systems, microwave tube refocusing systems, and possible display type devices.

**B73-10209**

**A THEORETICAL STUDY OF AERODYNAMIC NOISE GENERATION**

A. C. Peter (Rockwell Intern. Corp.)

Jun. 1973

**M-FS-24167**

Study focuses on physical mechanism of waves in fluid such as air. Strong interaction between energy of wave and fluid particle motion causes energy of wave to be dissipated. Dissipation depends not only on momentum, time-rate, and force, but also upon nature and magnitude of entropic-flow effects.

**B73-10210**

**LASER SYSTEM DETECTS AIR TURBULENCE**

W. K. Dahm, J. A. Dunkin, and E. A. Weaver

Jun. 1973

**M-FS-21244**

Laser beam is emitted from pod on side of aircraft. Some scattered light returns to aircraft, but at shifted frequency caused by Doppler effect from local air speeds. Current work focuses on extending range, including investigations of effects of particle density, focusing, back scatter efficiency, absorption, and other factors.

**B73-10212**

**REAL TIME STATISTICAL ANALYSIS OF ACOUSTIC EMISSION SIGNALS FOR FLAW MONITORING SYSTEMS**

F. E. Sugg (Rockwell Intern. Corp.) and F. J. Moskal (Rockwell Intern. Corp.)

Jun. 1973

**M-FS-24402**

Small structures are checked by monitoring samples for acoustical signal count. Flaws are located by observing relatively high acoustical activity within given area. Acoustical monitoring has been extended to large structures by dividing large samples into small areas and then monitoring each area separately.

**B73-10221**

**A HEAT FLOW CALORIMETER**

W. V. Johnston (Rockwell Intern. Corp.)

Aug. 1973

**GSFC-11434**

Reaction mechanism for nickel-cadmium cell is not known well enough to allow calculation of heat effects. Calorimeter can measure heat absorbed or evolved in cell, by determining amount of external heat that must be supplied to calorimeter to maintain constant flow to isothermal heat sink.

**B73-10242**

**IMPROVED PHOTOGRAPHIC PRINTS WITH A LINEAR RADIAL TRANSMISSION FILTER**

L. M. Weinstein

Aug. 1973

**LANGLEY-11221**

Linear Radial Transmission Filter (LRTF) is easy to use and yet results in prints which depict more information contained in

negative than can be shown by direct printing. LRTF is optical-quality filter which has maximum transmission in center and linear drop in transmission radially out from center.

**B73-10251**

**ATMOSPHERIC TEMPERATURE MEASUREMENTS BY RAMAN LASER SCATTERING**

W. J. Masica, J. A. Salzman, and T. A. Coney

Dec. 1973 See also NASA-TN-D-6879; NASA-TN-D-7126

**LEWIS-12065**

System makes continuous synoptic measurement of air temperatures and temperature profiles from the ground in real time. Development is based on principle that intensity distribution of Raman scattered laser light is a function of temperature and it is theoretically possible to measure air temperature by analyzing its Raman spectrum.

**B73-10252**

**TOTAL-PRESSURE MEASUREMENT IN PULSATING FLOWS**

L. N. Krause, T. J. Dudzinski, and R. C. Johnson

Dec. 1973 See also NASA-TM-X-68128

**LEWIS-12077**

Pneumatic-type probe was used as comparison instrument with total pressure tubes to determine true average pressure and, thus, to determine if nonlinear averaging effects were significant. Since pneumatic probe is more complicated to use than a total-pressure tube, it is used only as a comparison instrument to determine extent of averaging effects.

**B73-10262**

**LASER VELOCIMETER WITH TRANSVERSE AND ON-AXIS SENSITIVITY**

K. L. Orloff

Jun. 1973

**ARC-10642**

Laser Doppler velocimeters are used for measurement of localized fluid velocities without perturbation of flow field. Technique which utilizes only two outgoing beams polarized normally to one another can be processed in such a manner that local oscillator signal is obtained and usual dual-scatter velocity is also retrieved.

**B73-10268**

**OPTICAL DETECTION OF OIL ON WATER**

J. P. Millard and J. C. Arvesen

Jul. 1973

**ARC-10649**

Three radiometric techniques utilizing sunlight reflected and backscattered from water bodies have potential application for remote sensing of oil spills. Oil on water can be detected by viewing perpendicular polarization component of reflected light or difference between polarization components. Best detection is performed in ultraviolet or far-red portions of spectrum and in azimuth directions toward or opposite sun.

**B73-10279**

**WIDE-FIELD REFLECTIVE SCANNING OPTICAL SYSTEMS**

I. R. Abel (Honeywell Inc.)

Aug. 1973

**JSC-14096**

Catoptric optical scanning system provides relatively fast line-scan rate for two-dimensional coverage. Rapid scan rates require low focal ratios between components and smallest possible masses. System is relatively free from monochromatic defects and chromatic aberrations.

**B73-10283**

**MEASUREMENT OF X-RAY SCATTERING BY OPTICAL SURFACES**

R. S. Wriston (Martin Marietta Corp.)

Aug. 1973

**GSFC-11590**

Optical surfaces built for X-ray telescopes are made to reflect very short wavelengths that range in magnitude from 2 to 100 angstroms. Minor irregularities or contamination on surface of any telescope mirror can affect quality of optical image.

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Apparatus checks reflection of optical surfaces: scattering of X-rays is measured with angular accuracy of one arc-second.

**B73-10312**

#### **SELF-POWERED MIXER FOR PRESSURIZED CONTAINERS**

Y. Y. Hsu and B. T. Ebihard  
Dec. 1973

**LEWIS-12054**

Mechanical stirrer, installed entirely within tank, is powered by turbine driven by discharge flow of fluid. Contents of tank are automatically mixed whenever fluid in tank is discharged. Magnetic coupling eliminates need for shaft seal, particularly in high-pressure tanks.

**B73-10330**

#### **HOLOGRAM RECORDING TUBES**

J. H. Rajchman (RCA)  
Oct. 1973

**M-FS-22590; M-FS-22591**

Optical memories allow extremely large numbers of bits to be stored and recalled in a matter of microseconds. Two recording tubes, similar to conventional image-converting tubes, but having a soft-glass surface on which hologram is recorded, do not degrade under repeated hologram read/write cycles.

**B73-10336**

#### **A LASER HEAD FOR SIMULTANEOUS OPTICAL PUMPING OF SEVERAL DYE LASERS**

P. B. Mumola and B. T. McAlexander  
Oct. 1973

**LANGLEY-11341**

Device accomplishes simultaneous optical pumping using single flashlamp and electrical driver. Dye lasers require relatively low energy to operate (low-threshold pumping requirement) and provide simple method for producing simultaneous independent laser output at number of different wavelengths.

**B73-10378**

#### **IMAGE FORMATION IN MICROWAVE HOLOGRAPHY**

R. W. Cribbs (Electra-Physics Labs, Inc.) and B. L. Lamb (Electra-Physics Labs, Inc.)  
Sep. 1973

**ARC-10773**

Microwave holograms are made without offset reference beam, but it has been found that Van der Lugt filter can be used to produce image offset. Also, filter permits 'decoding' of holograms in contrast with usual practice of reconstructing visible-light analogs of original micro-wave wave fronts.

**B73-10379**

#### **MICROWAVE HOLOGRAPHY FOR NONDESTRUCTIVE TESTING**

R. W. Cribbs (Electra-Physics Labs, Inc.) and B. L. Lamb (Electra-Physics Labs, Inc.)  
Sep. 1973

**ARC-10774**

Holographic methods permit use of very large effective apertures so that weak signals can be collected over wide area and integrated to form image. Technique, modification of side-looking radar principle, can be used at very short ranges needed for nondestructive inspection of test specimens.

**B73-10381**

#### **CARRIER SUPPRESSION DEVICE FOR A HETERODYNE GAS ANALYZER**

E. A. McClatchie (Andros Inc.)  
Sep. 1973 See also B72-10198

**ARC-10785**

Analyzer operates with broadband light from blackbody infrared source. Light is passed sequentially through two gas-filled chambers to suitable infrared detector while pressures in gas-filled chambers are modulated in sinusoidal manner. Because pressure of infrared-absorbing gases in chambers is modulated, amount of light absorbed by gases is also modulated.

**B73-10383**

#### **SEPARATION OF GAS FROM LIQUID IN A TWO-PHASE FLOW SYSTEM**

L. G. Hayes and D. G. Elliott

Sep. 1973

**NPO-11556**

Separation system causes jets which leave two-phase nozzles to impinge on each other, so that liquid from jets tends to coalesce in center of combined jet streams while gas phase is forced to outer periphery. Thus, because liquid coalescence is achieved without resort to separation with solid surfaces, cycle efficiency is improved.

**B73-10399**

#### **COHERENCE-LENGTH EXTENDER**

R. L. Kurtz

Oct. 1973

**M-FS-22434**

Holograms of large objects may be formed by using several coherent low-intensity laser sources. If several low intensity laser sources are available, they can be applied simultaneously. Each source is then used to establish one object beam and one reference beam whose path lengths are equal, recording a small portion of the total object.

**B73-10409**

#### **METHOD OF PREDICTING IONIZATION-TYPE VACUUM GAGE SENSITIVITY FOR VARIOUS GASES**

R. Holanda

Dec. 1973 See also NASA-TN-D-6815

**LEWIS-12056**

Sensitivity of gage for one gas can be correlated to its sensitivity for other gases by the ratio of gas ionization cross sections. Ionization cross sections which best correlate with gage sensitivities vary according to gage type and ionization cross section energy level.

**B73-10417**

#### **MACH-ZEHNDER OPTICAL CONFIGURATION WITH BREWSTER WINDOW AND TWO QUARTER-WAVE PLATES**

T. R. Lawrence (Lockheed Corp.), L. K. Morrison (Lockheed Corp.), and M. C. Krause (Lockheed Corp.)

Dec. 1973

**M-FS-22741**

Configuration is improvement because of the following: It provides higher efficiency. It reduces or eliminates feedthrough of untranslated local oscillator, which would produce a beat signal at shifted frequency of translator. When used without translator and with low-power detector, telescope secondary mirror reflects portion of output to local oscillator.

**B73-10420**

#### **ULTRASONIC CALIBRATION DEVICE**

J. S. Heyman and J. G. Miller (Wash. Univ.)

Dec. 1973

**LANGLEY-11435**

Device is an instrument for producing known changes in both acoustic absorption and phase velocity. Calibration signal arises from actual change of acoustic parameters, not from electrical simulation. Instrument is able to simulate changes in sensitivity enhancement achieved by use of ultrasonic resonators, which cannot be achieved using electrical calibration techniques.

**B73-10421**

#### **A REAL TIME MOVING-SCENE HOLOGRAPHIC CAMERA**

R. L. Kurtz

Dec. 1973 See also B73-10434; B73-10435

**M-FS-21087**

Method can be useful laboratory tool for observation of rapidly moving objects such as bullets, aerodynamic bodies, and bodies undergoing collisions or interactions. Optical components of holographic system are positioned so light paths from laser source will be equal.

**B73-10422**

#### **ELASTIC LIGHT-SCATTERING MODULATOR: A CONCEPT**

D. H. R. Vilkomerson (RCA) and R. S. Mezrich (RCA)  
Dec. 1973  
M-FS-22724

Simple structure can be used as electrically-controlled light valve, to scatter both transmitted and reflected beams. Its operation is based on physical phenomenon called frosting. Device may be of interest to manufacturers of page compositors, alphanumeric displays, flat-panel displays, large-screen televisions, and optical input terminals for computers.

**B73-10423**  
**LASER-ACTUATED HOLOGRAPHIC STORAGE DEVICE**  
R. A. Gange (RCA), E. M. Nagle (RCA), and C. C. Steinmetz (RCA)  
Nov. 1973  
M-FS-22768

Device permits automatic selection of one out of thousands of pages in holographic memory system by using laser beam. In typical operation for 2 to 3 C temperature interval, using dc power supply with no power regulation, holograms were successfully written and erased over 2- by 2-cm area, using 80-mW argon laser beam.

**B73-10434**  
**MOTION COMPENSATOR FOR HOLOGRAPHIC MOTION PICTURE CAMERA**  
R. L. Kurtz  
Dec. 1973 See also B73-10421; B73-10435  
M-FS-22517

When reference beam strikes target it undergoes Doppler shift dependent upon target velocity. To compensate, object beam is first reflected from rotating cylinder that revolves in direction opposite to target but at same speed. When beam strikes target it is returned to original frequency and is in phase with reference beam. Alternatively this motion compensator may act on reference beam.

**B73-10435**  
**PHOTOGRAPHY OF RANDOM MOTION WITH A HOLOGRAPHIC CAMERA**  
R. L. Kurtz  
Dec. 1973 See also B73-10421; B73-10434  
M-FS-22537

Three-dimensional system uses two additional mirrors and path compensators. It is essentially three mutually-orthogonal one-dimensional systems with common focus. Laser beam is split into four parts, three of which are object beams; and fourth is reference beam. Size of each ellipse depends on magnitude of velocity vectors.

**B73-10440**  
**FLAW DETECTION BY MECHANICAL RESONANT MEASUREMENT**  
O. Buck (Rockwell Intern. Corp.), H. L. Marcus (Rockwell Intern. Corp.), G. A. Alers (Rockwell Intern. Corp.), and R. V. Inman (Rockwell Intern. Corp.)  
Feb. 1974  
M-FS-19218

Testing technique is based on analysis of varying frequency scan applied to measured samples. Any changes in resonant-frequency harmonics detected in samples are used to indicate size of fault. Testing apparatus uses drive mechanism to apply vibrating force to sample. Force is applied longitudinally along axis to eliminate directionality on flexural vibrations.

**B73-10441**  
**IMPROVED DISCRIMINATION IN PHOTOGRAPHIC DENSITY CONTOURING**  
R. A. Godding (Technicolor Graphic Serv., Inc.)  
Feb. 1974  
JSC-12588

Density discrimination can be accomplished through use of special photographic contouring material which has two sensitive layers (one negative, one positive) on single support. Process will be of interest to investigators who require finer discrimination of densities of original photograph for purposes such as

identification of crops and analysis of energy levels of radiating objects.

**B73-10458**  
**VERSATILE ELECTRONIC LOAD**  
K. R. Mussen  
Mar. 1974  
NPO-13202

Variable load has very fast response under wide range of simulated dynamic operating conditions, and can accept inputs up to 1000 watts. Many types of signals may be applied to load. Variable pulse generator and flip-flop produce rectangular waveform. Other signals include steady state step and single pulse.

**B73-10462**  
**MONEL-SHOT AND SCREEN REGENERATORS**  
C. W. Browning (Garrett Corp.)  
Mar. 1974  
GSFC-11593

Monel has been found to be ideal material for matrix of regenerators operating in temperature range of 325 K to 50 K. Two best shapes are as spheres or as wire mesh. For given size of regenerator, spherical shots are preferable for low-temperature operation. At high temperatures, mesh would be superior by virtue of its lower flow resistance.

**B73-10468**  
**FINE GUIDANCE FOR A SPACEBORNE TELESCOPE**  
S. Rosin (Kollsman Instruments Corp.) and M. Amon (Kollsman Instruments Corp.)  
Mar. 1974  
GSFC-11487

Two transparent plates are mounted at equal and opposite angles in secondary optical-system housing, angles being set for optimum astigmatism correction. Rotation of secondary housing assembly and translation of detector are proportional to angular position of secondary image. Combined movement of two retains image within sagittal foci of secondary system.

**B73-10471**  
**IMPROVED METHOD FOR DESIGN OF EXPANSION-CHAMBER MUFFLERS WITH APPLICATION TO OPERATIONAL HELICOPTER**  
T. L. Parrott  
Mar. 1974  
LANGLEY-11548

Field test of muffler designed with aid of this method was conducted on helicopter with known exhaust-noise problem. When exhaust noises were compared for hover-flight conditions, muffler system was found to reduce exhaust noise by approximately 11 db. No significant degradation in engine performance was observed.

**B73-10482**  
**ANALYSES OF UNSTEADY ENTROPIC-FLOW PROCESSES**  
A. C. Peter (Rockwell Intern. Corp.)  
Mar. 1974  
M-FS-24475

One important aspect in these analyses is the derivation of physical mechanism of converted entropic perturbations, which is also directly related to mixing of fluids. In development of frictional fluid motion, entropy gradients of moving fluid particles perpetually increase. This growth is due to fluid particles which have been heated by frictional flow effects and are constantly lagging behind colder fluid.

**B73-10488**  
**PROCESS FOR THE PRODUCTION OF STAR-TRACKING RETICLES**  
A. R. Toft and W. O. Smith  
Mar. 1974  
GSFC-11188

Reticles designed with quartz bases are masked with desired pattern and then are coated with highly adherent layers of chromium, chromium silver alloy, silver, copper, and black

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chromium (mixture of chromium and chromium oxides). Black chromium final layer produces required nonreflective surface.

**B73-10490**  
**POROUS SURFACE MICROPHONE FOR MEASURING ACOUSTIC SIGNALS IN TURBULENT WINDSTREAMS**  
D. U. Noiseux (Boit Beranek and Newman, Inc.)  
Dec. 1973 See also NASA-CR-114593  
**ARC-10776**

Microphone sensor transforms pressure variations caused by acoustic signals and turbulence into electrical output. Microphone is protected from direct thrust of slipstream by porous barrier. Airfoil is designed to create no turbulence in air flow over porous surface.

**B73-10493**  
**METAL TUBE USED AS SOLAR ENGINE**  
J. R. Jedlicka, L. R. Guist, and R. M. Beam  
Dec. 1973  
**ARC-10461**

Ends of metal tube are fastened to axles which are supported on bearings so tube can rotate about its long axis while subjected to invariant bending moment that stresses it along longitudinal axis of rotation. Heat absorbed leads to expansion of metal, which unbalances internal forces and generates rotational moment in tube.

**B73-10501**  
**HIGH-SPEED SPECTROGRAPH FOR SHOCK TUBE STUDIES**  
W. J. Borucki  
Dec. 1973  
**ARC-10772**

Instrument provides information on spatial distribution of electron density of gas flow in high-performance shock tube. System permits measurement of profiles of hydrogen-alpha and -beta lines with enough spectral range to record spectral features from the near ultraviolet to the long-wavelength cutoff of photographic film.

**B73-10516**  
**FABRICATION OF OPTICAL REFLECTING DIFFRACTION GRATINGS BY LIGHT-INTERFERENCE PHENOMENON**  
A. J. Caruso and J. Zaniewski  
Mar. 1974  
**GSFC-11860**

Features of technique: major reduction in cost of fabrication; gratings exhibit low stray or scattered radiation, improve signal noise ratio, and eliminate false spectral-lines; gratings can be fabricated free of optical aberrations, with high groove frequencies, and on practically any surface geometry; and fabrication time has been reduced.

**B73-10517**  
**STABILIZING A GASEOUS OPTICAL LASER**  
A. Jauan (MIT) and K. Shimoda (MIT)  
Mar. 1974  
**XGS-03644**

Frequency of gaseous optical laser can be stabilized by sinusoidally modulating the geometry of the cavity. Fabry-Perot dielectric mirrors are mounted in two Invar blocks that are connected by four magnetostrictive bars. Each bar has three coils to sinusoidally modulate system. Ac establishes frequency, and dc the average value; both are supplied to coil from control system.

## 04 MATERIALS/CHEMISTRY

**B73-10002**  
**GETTERING CAPSULE FOR REMOVING OXYGEN FROM**

**LIQUID LITHIUM SYSTEMS**  
L. K. Tower and R. Breitwieser  
Mar. 1973  
**LEWIS-11509**

Capsule consisting of tantalum shell lined with tantalum screen and partially filled with lithium and pieces of yttrium is immersed in hot lithium stream. Oxygen is removed from stream by being absorbed by gettering capsule. Oxygen passes through capsule wall and into lithium inside capsule where it reacts with yttrium to form Y<sub>2</sub>O<sub>3</sub>.

**B73-10007**  
**FIBER COMPOSITE MATERIALS: A SURVEY OF FIBER MATRIX INTERFACE MECHANICS**  
C. C. Chamis  
Mar. 1973 See also NASA-TN-D-6588  
**LEWIS-11924**

Report is described which discusses mechanism of load transfer from matrix to fiber through interface and effects of interface on composite structural integrity. Theoretical considerations are supplemented with experimental data. General trends and significant points are illustrated graphically.

**B73-10014**  
**TECHNIQUE FOR THE POLYMERIZATION OF MONOMERS FOR PPO/GRAPHITE FIBER COMPOSITES**  
T. T. Serafini, P. Delvigs, and R. D. Vannucci  
Mar. 1973 See also B71-10442  
**LEWIS-11879**

Impregnation of fiber prior to appreciable polymerization completely eliminates impregnation problems encountered with use of high viscosity high molecular weight polyphenylquinoxalines (PPQ) solutions. Major part of polymerization of reactant mixture is conducted on fiber during solvent removal and final curing stages.

**B73-10019**  
**RUBBER COMPOSITION COMPATIBLE WITH HYDRAZINE**  
J. Repar (Accessory Products Co.)  
Jan. 1973  
**NPO-11440**

Formulation improves compatibility of butyl rubbers with hydrazine while reducing permeation to low levels necessary for prolonged storage in space. This is accomplished by replacing carbon-black filler with inert materials such as hydrated silica or clay. Pressure increases suggest that hydrazine is decomposed only slightly by new type of rubber.

**B73-10020**  
**EVALUATION OF THERMAL INSULATION MATERIALS**  
O. J. Wilbers (McDonnell Douglas Corp.), J. C. Conti (McDonnell Douglas Corp.), J. V. McGee (McDonnell Douglas Corp.), and J. I. McPherson (McDonnell Douglas Corp.)  
Jan. 1973 See Also NASA-CR-109612  
**NPO-11586**

Data was obtained on silicone-bonded fiberglass, isocyanurate foam, and two dozen other insulators. Materials were selected to withstand heat sterilization, outer space, and the Martian atmosphere. Significant environmental parameters were vibration, landing shock, and launch venting.

**B73-10021**  
**INCREASING THE SENSITIVITY OF THE JAFFE REACTION FOR CREATININE**  
H. Y. Tom  
Jan. 1973  
**NPO-11587**

Study of analytical procedure has revealed that linearity of creatinine calibration curve can be extended by using 0.03 molar picric acid solution made up in 70 percent ethanol instead of water. Three to five times more creatinine concentration can be encompassed within linear portion of calibration curve.

**B73-10022**  
**METHOD FOR ESTIMATING SOLUBILITY PARAMETER**  
D. D. Lawson and J. D. Ingham

Jan. 1973  
NPO-11647

Semiempirical correlations have been developed between solubility parameters and refractive indices for series of model hydrocarbon compounds and organic polymers. Measurement of intermolecular forces is useful for assessment of material compatibility, glass-transition temperature, and transport properties.

**B73-10024**  
**STABLE PALLADIUM ALLOYS FOR DIFFUSION OF HYDROGEN**

M. Patapoff  
Jan. 1973  
NPO-11747

Literature search on hydrogen absorption effect on palladium alloys revealed existence of alloy compositions in which alpha-beta transition does not take place. Survey conclusions: 40% gold alloy of palladium should be used in place of palladium; alloy must be free of interstitial impurities; and metallic surfaces of tube must be clean.

**B73-10030**  
**AUTOMATED METHOD FOR STUDY OF DRUG METABOLISM**

R. L. Furner and D. D. Feller  
Feb. 1973  
ARC-10469

Commercially available equipment can be modified to provide automated system for assaying drug metabolism by continuous flow-through. System includes steps and devices for mixing drug with enzyme and cofactor in the presence of pure oxygen, dialyzing resulting metabolite against buffer, and determining amount of metabolite by colorimetric method.

**B73-10036**  
**GLASS TRANSITION TEMPERATURES OF LIQUID PREPOLYMERS OBTAINED BY THERMAL PENETROMETRY**

J. E. Potts, Jr. (Union Carbide Corp.) and A. C. Ashcraft (Union Carbide Corp.)  
Feb. 1973  
NPO-11730

Thermal penetrometry is experimental technique for detecting temperature at which frozen prepolymer becomes soft enough to be pierced by weighted penetrometer needle; temperature at which this occurs is called penetration temperature. Apparatus used to obtain penetration temperatures can be set up largely from standard parts.

**B73-10037**  
**TLC DETERMINATION OF FUNCTIONALITY IN PREPOLYMERS**

J. E. Potts, Jr. (Union Carbide Corp.) and A. C. Ashcraft (Union Carbide Corp.)  
Feb. 1973  
NPO-11731

Application of thin-layer chromatographics provides rapid qualitative determination of functional distribution in experimental prepolymer. Functionality distribution is of fundamental importance for it determines: (1) manner in which given carboxyl-terminated prepolymer will cure and (2) physical properties of resulting product.

**B73-10039**  
**AN INEXPENSIVE AND EFFECTIVE METHOD FOR CALCULATING THE STRENGTH OF RANDOMLY REINFORCED FIBER COMPOSITES**

C. C. Chamis  
Mar. 1973 See also NASA-TN-D-6696  
LEWIS-11985

Planar randomly reinforced fiber composites (PRRFC) is pseudoisotropic laminate with large number of ply orientation combinations where strength is function of these ply orientation combinations. Laminate theory can be applied to determine strength of PRRFC, and in conjunction with composite micro-

and macromechanics can predict mechanical properties of PRRFC's with any fiber/matrix combination.

**B73-10044**  
**A SPIRALED NIOBIUM TIN SUPERCONDUCTIVE RIBBON**

W. D. Coles  
Feb. 1973 See also NASA-TM-X-68124  
LEWIS-11726

Copper film is vapor-deposited on clean ribbon and sprayed with photosensitive etch-resistant material. Photographic film masks are placed on ribbon and exposed to ultraviolet light. Etchant removes copper and exposure to oxidizing atmosphere forms niobium oxide. Photosensitive material is removed and ribbon is immersed in molten temperatures.

**B73-10056**  
**VAPOR PHASE GROWTH OF GROUP 3, 4, AND 5 COMPOUNDS BY HCl TRANSPORT OF ELEMENTS**

R. C. Tyagi (NCR Res. Associate), W. J. Debnam, Jr., M. F. McNear, R. K. Crouch, and R. A. Breckenridge  
Feb. 1973  
LANGLEY-11144

Technique has been devised for vapor-phase epitaxial growth of group 3, 4, and 5 binary, ternary, or quaternary compounds by HCl transport of the constituent elements or dopants. Technique uses all the constituents of the alloy system in their elemental form. Transport of these elements by an HCl + H<sub>2</sub> carrier gas facilitates their transport as subchlorides.

**B73-10060**  
**VACUUM-STRIPPED SILICONE BINDER FOR THERMAL-CONTROL PAINT**

J. E. Gilligan (IIT Res. Inst.) and F. O. Rogers (IIT Res. Inst.)

Feb. 1973  
M-FS-21397

Silicone elastomer is placed in evacuating system, heated to 160 C and held at this temperature for 24 hours. Elastomer is then cooled to room temperature in vacuum, producing upgraded, low outgassing polymer of increased molecular weight.

**B73-10062**  
**LUBRICATION HANDBOOK**

M. E. Campbell and M. B. Thompson  
Feb. 1973  
M-FS-22326

Information on lubricants from government reports, military specifications, qualified parts lists, and suppliers of commercial lubricants has been consolidated in one source. Handbook includes data on chemical and physical properties of solid, bonded solid, and liquid lubricants; dispersions and composites; and greases, oils, and hydraulic fluids.

**B73-10063**  
**RESIDUAL STRESS EFFECTS ON THE IMPACT RESISTANCE AND STRENGTH OF FIBER COMPOSITES**

C. C. Chamis  
Apr. 1973 See also NASA-TM-X-52881; NASA-TN-D-6146; NASA-TN-D-6464  
LEWIS-11984

Equations have been derived to predict degradation effects of microresidual stresses on impact resistance of unidirectional fiber composites. Equations also predict lamination residual stresses in multilayered angle ply composites.

**B73-10068**  
**METAL-METAL REINFORCED LAMINAR COMPOSITES**

J. W. Weeton and C. A. Hoffman  
Feb. 1973  
LEWIS-11790

Two prototype laminar composites have shown potential for high strength and high temperature applications. These composites might be made with less in-place anisotropy and be less expensive than comparable fiber composites.

**B73-10069  
PRODUCTION OF CIRCULAR POLYMER-GLASS FABRIC COMPOSITES**

E. E. Hardesty (Goldsworthy Engineering, Inc.)

Feb. 1973

**M-FS-22125**

Potentially automated pultrusion technique has been provided for production of curved, glass-reinforced polyimide, epoxy, and graphite reinforced structures. Specially designed apparatus has been manufactured for production of curved structures.

**B73-10071  
SEMI-ORGANIC STRUCTURAL ADHESIVE FOR ALUMINUM**

S. C. Kwan (Monsanto Corp.), M. T. Lehman (Monsanto Corp.), E. A. McElhill (Monsanto Corp.), J. J. O'Connell (Monsanto Corp.), R. C. Steeves (Monsanto Corp.), and G. Tsigdinos (Monsanto Corp.)

Feb. 1973

**M-FS-21328**

Structural adhesive consists of titanium chelate polymer, reactive plasticizer, and cure accelerator (phenylsilanetriol). Mixture polymerizes in situ in 85 hours at 170 C.

**B73-10077  
OXIDATION RESISTANT, THORIA-DISPERSED NICKEL-CHROMIUM-ALUMINUM ALLOY**

S. Baranow (Fansteel, Inc.) and L. J. Klingler (Fansteel, Inc.)

Mar. 1973 See also NASA-CR-120796

**LEWIS-11541**

Modified thoria-dispersed nickel-chromium alloy has been developed that exhibits greatly improved resistance to high-temperature oxidation. Additions of aluminum have been made to change nature of protective oxide scale entirely and to essentially inhibit oxidation at temperatures up to 1260 C.

**B73-10079  
FATIGUE OF BORON-ALUMINUM COMPOSITES BONDS AND JOINTS**

M. S. Hersh (Gen. Dynamics Corp.)

Mar. 1973

**M-FS-22326**

Study examines effects of boron filament diameter on bonds and joints in boron-aluminum composite. Data include static strength, fatigue, and dynamic moduli of elasticity. Manson-Coffin analyses and metallurgical and fracture surface evaluation were also performed.

**B73-10080  
A NEW INTERMEDIATE FOR THE PRODUCTION OF FLEXIBLE STABLE POLYMERS**

J. A. Webster (Monsanto Corp.)

Mar. 1973

**M-FS-22355**

Method of incorporating ether linkages into perfluoroalkylene segment of a dianhydride intermediate yields intermediate that may be used in synthesis of flexible, stable polyimides for use as high-temperature, solvent-resistant sealants.

**B73-10081  
METALLIC COMPOSITES AS HIGH-TEMPERATURE FASTENERS**

F. D. George (United Aircraft Corp.)

Mar. 1973

**M-FS-22438**

Metallic composites can be fabricated in one-step process in which mixture is directionally solidified. Phase-reinforced eutectic alloys have superior high-temperature mechanical properties.

**B73-10084  
PREPARATION OF PREPREG GRAPHITE TAPE WITH INSOLUBLE POLYMER**

C. I. Yates (Rockwell Intern. Corp.)

Mar. 1973 See also NASA-CR-115713

**JSC-14313**

Powdered polymer is finely ground. Second polymer, soluble, is mixed with appropriate solvent. Milled polymer and graphite filaments are added to soluble polymer-solvent solution to create slurry. Slurry is dried, and when ready for processing, the soluble, binder-polymer is removed by heat during precure or cure cycle.

**B73-10085  
FIRE RETARDANT CELLULOSIC FOAM**

M. Luttinger (Battelle Mem. Inst.)

Mar. 1973

**JSC-14336**

Method mixture of cyanamide, phosphoric acid, and monobasic ammonium phosphates for preliminary treatment of paper. Papier-mache, in second step, is pulped in water and latex is added. Urea formaldehyde solution mixed to maximize foaming and resin dispersion is added. Mixture is then cast within 30 to 60 seconds and dried twice.

**B73-10090  
SELF-STERILIZING POLYMERS**

J. J. Tulis (Becton, Dickinson and Co.), D. J. Daley (Becton, Dickinson and Co.), and G. B. Phillips (Becton, Dickinson and Co.)

Feb. 1973

**M-FS-22054**

Addition of approximately 1% paraformaldehyde to room-temperature-vulcanizing potting polymer results in effective, controllable germicide. When heated above ambient temperatures, paraformaldehyde releases dry formaldehyde, which can penetrate enclosed areas and packages, will not damage material, and leaves no permanent residue.

**B73-10102  
NONFLAMMABLE POTTING-ENCAPSULATING AND CONFORMAL COATING COMPOUNDS**

S. L. Lieberman (Furane Plastics, Inc.)

Mar. 1973 See also NASA-CR-115364

**JSC-14164; JSC-14166**

Two fluorosilicone rubber formulations have been produced which are nonflammable or self-extinguishing. Extensive report was prepared which includes information on testing and describes many alternate formulations.

**B73-10103  
OXYGEN SENSITIVE PAPER**

J. F. Whidby (GE)

Mar. 1973

**M-FS-22354**

Paper is impregnated with mixture of methylene blue and ethylenediaminetetraacetic acid. Methylene blue is photo-reduced to leuco-form. Paper is kept isolated from oxygen until ready for use. Paper can be reused by photo-reduction after oxygen exposure.

**B73-10108  
HOLOGRAPHIC NONDESTRUCTIVE TESTING OF LAMINATES**

F. H. Stuckenberg (Rockwell Intern. Corp.)

May 1973

**JSC-19107**

Very small differences in laminate thickness result in interference fringes in holograph image. These indicate presence of unbonded area. Theoretical knowledge of membrane deflection may be used in conjunction with reduced number of pretest experiments to determine number of optical fringes that should appear for given laminate.

**B73-10113  
AUTOIGNITION TEST CELL WITH FLEXIBLE ATMOSPHERE CONTROL**

D. Evans, C. L. Springfield, and C. Bryan (Southern Res. Inst.)

Jun. 1973

**KSC-10198**

Spontaneous combustion temperatures are usually found by simply beating material until it bursts into flames. Test cell allows control of test atmosphere and composition. Reusable device

permits periodic sampling of decomposition products in test atmosphere. With modifications, cell could be used to determine melting points and reactivities of wide variety of substances.

**B73-10121  
LIGHTWEIGHT GRAPHITE/POLYIMIDE PANELS**

J. G. Poesch (Hercules, Inc.) and J. B. Merlette (Hercules, Inc.)  
May 1973 See also NASA-CR-115421; NASA-CR-115637;  
NASA-CR-128610  
JSC-14376

Panels are constructed of honeycombed polyimide/graphite core covered with thin face sheet of same material. Fabrication is based on extension of thin-gage graphite technology and modification of glass filament polyimide honeycomb techniques.

**B73-10142  
DESIGN AND MATERIAL SELECTION FOR INVERTER  
TRANSFORMER CORES**

W. T. McLyman  
Mar. 1973  
NPO-11726

Report is announced which studied magnetic properties of candidate materials for use in spacecraft transformers, static inverters, converters, and transformer-rectifier power supplies. Included are material characteristics for available alloy compositions in tabular form, including: trade names, saturated flux density, dc coercive force, loop squareness, material density, and watts per pound at 3 KHz.

**B73-10147  
CALIBRATION OF DISSOLVED OXYGEN STANDARD FOR  
ANALYSIS WITH METHYLENE BLUE**

J. F. Whidby (GE)  
May 1973  
M-FS-22363

Accurate standard solutions of oxygen can be prepared with this apparatus. Sample may be used as a dissolved oxygen standard with methylene blue or with other techniques such as gas chromatography.

**B73-10148  
A NEW CONCEPT FOR JOINING DISSIMILAR COM-  
POSITES**

K. C. Dullea (Rockwell Intern. Corp.) and J. A. Evangelista  
(Rockwell Intern. Corp.)  
May 1973  
M-FS-24307

Bi-composite joint serves as interface between two dissimilar materials by interleaving plies of one composite with plies of another. This interleaving forms transition area between composites. Voids are filled in with epoxy resin to form strong, smooth transition between two materials.

**B73-10149  
AN IMPROVED TECHNIQUE FOR THE USE OF ZINC-RICH  
COATINGS**

W. J. Paton  
May 1973  
KSC-10786

Blistering and peeling of topcoats used over ethyl silicate, inorganic, zinc-rich protective coatings are virtually eliminated when primer is allowed to cure outdoors for extended period of time and is moistened during process.

**B73-10151  
ION-TRACER ANEMOMETER**

R. L. Bass (Southwest Res. Inst.), T. E. Owen (Southwest Res. Inst.), C. R. Gerlach (Southwest Res. Inst.), and S. A. Suhler  
(Southwest Res. Inst.)  
Mar. 1973  
M-FS-21399

Gas velocity measuring instrument measures transport time of ion-trace traveling fixed distance between ionization probe and detector probe. Electric field superimposes drift velocity onto flow velocity so travel times can be reduced to minimize ion diffusion effects.

**B73-10153  
THIN FILM THERMOELECTRIC DEVICES AS THERMAL  
CONTROL COATINGS: A STUDY**

J. M. Clemons and A. C. Krupnick  
May 1973 See also NASA-TM-X-64570  
M-FS-21384

Peltier effect, Thomson effect, and Seebeck effect are utilized in design of thermal control coating that serves as versatile means for controlling heat absorbed and radiated by surface. Coatings may be useful in extreme temperature environment enclosures or as heat shields.

**B73-10168  
HYDROGEN-ENVIRONMENT EMBRITTLEMENT OF MET-  
ALS: A STUDY**

W. T. Chandler (Rockwell Intern. Corp.), R. P. Frohmer (Rockwell Intern. Corp.), R. P. Lewett (Rockwell Intern. Corp.), W. B. McPherson (Rockwell Intern. Corp.), and R. J. Walter (Rockwell Intern. Corp.)  
Jun. 1973  
M-FS-22540

Study includes extensive tests examining effects of hydrogen environment on different high-strength metals and alloys. Recommendations for preventing metal failure include use of hydrogen-resistant coatings and inhibitors. Study includes references to related investigations and discussion of work in progress.

**B73-10172  
AUTOCLAVE HEAT TREATMENT FOR PREALLOYED  
POWDER PRODUCTS**

J. C. Freche and R. L. Ashbrook  
May 1973 See also NASA TN-D-7117  
LEWIS-11953

Technique could be applied directly to loose powders as part of hot pressing process of forming them to any required shapes. This would eliminate initial extrusion step commonly applied to prealloyed powders, substantially reduce cost of forming operation, and result in optimum properties.

**B73-10180  
NEW EXPLOSIVE SEAM WELDING CONCEPTS**

L. J. Bement  
Jun. 1973 See also B72-10002  
LANGLEY-11211

Recently developed techniques provide totally-confined linear explosive seam welding and produce scarf joint with linear explosive seam welding. Linear ribbon explosives are utilized in making narrow, continuous, airtight joints in variety of aluminum alloys, titanium, copper, brass, and stainless steel.

**B73-10187  
HANDBOOK ON THERMOPHYSICAL PROPERTIES OF  
OXYGEN**

H. M. Roder (NBS), L. A. Weber (NBS), P. M. Ordin, and G. Mandel.  
Jun. 1973 See also NASA-SP-3071; NASA-SP-3072  
LEWIS-11962

Handbook has been compiled by Cryogenic Data Center of National Bureau of Standards. It covers thermodynamic functions, physical properties, and heat transfer data for oxygen. Handbook addresses primarily low temperature regime, but also includes some data above room temperature.

**B73-10188  
HANDBOOK OF CLEANING REQUIREMENTS, PRO-  
CEDURES, AND VERIFICATION TECHNIQUES FOR  
OXYGEN SYSTEMS**

H. Bankaitis and C. F. Schueller  
Jun. 1973 See also NASA-SP-3071; NASA-SP-3072  
LEWIS-11963

Oxygen system cleaning specifications have been drawn from twenty-three government and industrial sources. Cleaning processes for meeting these specifications and recommended postcleaning inspection procedures are compiled in handbook.

Microfiche supplement of pertinent pages of listed references is included.

**B73-10194**  
**REDUCTIVE CLEAVAGE OF THE PEPTIDE BOND**

J. Holian and W. M. Garrison

Jun. 1973

**LRL-10026**

In many biological research efforts, long chain organic molecules are studied by breaking large molecules into smaller components. Cleavage technique of recent interest is the use of solvated electrons. These are formed when aqueous solutions are bombarded with gamma radiation. Solvated electron is very reactive and can reduce most any species present, even to form free radicals.

**B73-10208**  
**THERMALLY RESPONSIVE MECHANICAL ACTUATOR**

J. M. Madey

Aug. 1973

**GSFC-11897**

Device built for use in heat control, heat measurement, and mechanical actuation by heat include thermometers, thermostats, safety switches, circuit breakers, and mechanical actuators. Silicon rubber has highest coefficient of expansion of any known material and seems suitable for most of these devices.

**B73-10213**  
**EFFECTS OF ENVIRONMENTAL EXPOSURE ON CRYOGENIC THERMAL INSULATION MATERIALS**

R. T. Parnley (Lockheed Missiles & Space Co.), F. J. Smith (Lockheed Missiles & Space Co.), A. P. Glassford (Lockheed Missiles & Space Co.), J. Coleman (Lockheed Missiles & Space Co.), and D. R. Stevenson (Lockheed Missiles & Space Co.)

Nov. 1973 See also NASA-CR-120978; NASA-CR-120979

**LEWIS-12007**

Investigation was made to optimize selection of insulation materials for reusable space vehicles which will be repeatedly operated over periods of up to ten years. Results of study are summarized in two reports. Volume I describes tests and significant findings. In Volume II, extensive test data obtained are organized in handbook form.

**B73-10215**  
**REFRACTORY PORCELAIN ENAMEL PASSIVE-THERMAL-CONTROL COATING FOR HIGH-TEMPERATURE SUPER-ALLOYS**

H. Levin (Hughes Aircraft Co.), B. H. Auker (Hughes Aircraft Co.), and M. N. Gardos (Hughes Aircraft Co.)

Aug. 1973

**M-FS-22324**

Study was conducted to match thermal expansion coefficients thereby preventing enamels from cracking. Report discusses various enamel coatings that are applied to two different high-temperature superalloys. Study may be of interest to manufacturers of chemical equipment, furnaces, and metal components intended for high-temperature applications.

**B73-10224**  
**CHEMICAL PRETREATMENT FOR THE DISTILLATION OF URINE**

T. L. Hurley (Chemtrac Inc.)

Aug. 1973 See also NASA-CR-128878

**JSC-14225**

Pretreatment of urine prevents micro-organism growth in boiler and kills micro-organisms in condenser. Chemicals also clean evaporation surface, fix ammonia in boiling chamber, and suppress foaming.

**B73-10228**  
**FORMALDEHYDE MONITOR FOR AUTOMOBILE EX-HAUSTS**

W. C. Easley

Aug. 1973

**LANGLEY-11352**

Device makes use of microwave spectral absorption in low-Q resonant Stark cell, and indications are that ultimate sensitivity of instrument is within 100 parts per billion of formaldehyde. Microwave source is very small and requires only six-volt dc bias for operation. Coarse tuning is accomplished mechanically and fine tuning by adjusting dc-bias voltage.

**B73-10238**  
**APPLYING HIGH-EMITTANCE AND SOLAR-ABSORPTANCE COATING TO ALUMINUM**

D. J. Progar

Aug. 1973

**LANGLEY-10151**

Coated surface withstands space environment with negligible change in radiation characteristics and physical properties. Process can be used with any porous substance, as long as pores are large enough to allow molecules of reacting solutions to enter and yet not so large as to allow nickel sulfide to be leached out of pores before sealing.

**B73-10253**  
**AUTOMATIC DEVICE FOR SHELL FREEZING OF LIQUIDS**

B. Kelbaugh, C. Owen, and G. L. Picciolo

Oct. 1973

**GSFC-11737**

Unit is insulated enclosure designed to contain liquid nitrogen. It also includes set of stainless steel rotating rods for holding vessels containing liquids to be frozen, and electric drive mechanism for rotating these rods. Present device will accept 10 vessels at a time.

**B73-10254**  
**GRAPHITE/POLYIMIDE LAMINATES WITH NEAR-ZERO THERMAL EXPANSION**

W. N. Reynolds (Rockwell Intern. Corp.) and A. H. Striepens (Rockwell Intern. Corp.)

Aug. 1973

**JSC-17662; JSC-17928**

Composite structures can be laminated to have very low coefficients of thermal expansion. Such structures are light and strong and have many uses where expansion or contraction with temperature change is undesirable. One application is with instruments that measure thermal expansion.

**B73-10260**  
**ZETA POTENTIAL CONTROL FOR ELECTROPHORESIS CELLS**

G. L. Fogal (GE)

Aug. 1973

**M-FS-22333**

Zeta potential arises from fact that ions tend to be adsorbed on surface of cell walls. This potential interfaces with electric field sensed by migrating particles and degrades resolution of separation. By regulating sign and magnitude of applied potential induced charge can be used to increase or decrease effective wall zeta potential.

**B73-10269**  
**FABRICATION TECHNIQUES FOR POLYBENZIMIDAZOLE COMPOSITES**

J. A. Parker, E. L. Winkler, D. Kourtides, and B. S. Marks (Lockheed Missiles & Space Co.)

Jul. 1973 See also NASA-CR-1723

**ARC-10724**

Performance of polybenzimidazole composites as ablation shields can be substantially improved by thermal crosslinking. Program was designed to develop new processing methods and techniques for fabrication of polybenzimidazole composites. Report, which describes fabrication in detail, also includes specification and manufacturing standards.

**B73-10271**  
**'DRY-COLUMN' CHROMATOGRAPHY OF PLANT PIGMENTS**

F. H. Woeller, M. F. Lehwalt, and V. I. Oyama

Jul. 1973

**ARC-10780**

Separation of plant pigments which can be accomplished on thin-layer silica plates with mixture of petroleum ether, halocarbon, acetone, and polar solvent can be readily translated into dry-column technique that yields reproducible chromatograms after elution in fashion of liquid chromatography with fluorimeter as detector. Best solvent system was found to be mixture of petroleum ether, dichloromethane, acetone, and ethyl acetate.

**B73-10310****LIQUID AND GASEOUS OXYGEN SAFETY REVIEW**

A. Lapin (Air Products & Chemicals, Inc.)

Dec. 1973 See also NASA-CR-120922; SP-3071; SP-3072

**LEWIS-12041**

Materials used in oxygen systems and allowable oxygen environments are specified for each material. Design criteria, cleaning procedures and quality control methods are covered. Guidelines for protection against hazards involved with production, transportation, storage and use of oxygen are presented. Study also lists extensive references.

**B73-10314****CREEP-FATIGUE ANALYSIS BY STRAINRANGE PARTITIONING**

S. S. Manson, G. R. Halford, and M. H. Hirschberg

Dec. 1973 See also NASA-TM-X-67838; NASA-TM-X-68023;

NASA-TM-X-68171

**LEWIS-12072**

Strainrange Partitioning provides unifying framework for characterizing high-temperature, low-cycle, creep-fatigue properties of metals and alloys. Method offers distinct advantage to designers of immediately providing reliable upper and lower bounds on cyclic life for any type of inelastic strain cycle that may be encountered in service.

**B73-10315****RESISTANCE SPOT WELDING OF DISPERSION-STRENGTHENED NICKEL ALLOYS**

T. J. Moore

Dec. 1973 See also NASA-TN-D-7256

**LEWIS-12075**

To develop easily-applied production method for resistance spot welding use unrecrystallized sheet material, develop welding schedule that will produce a solid-state spot weld without recrystallizing sheet, and postheat to produce grain growth across weld line during recrystallization of sheet material.

**B73-10316****SINGLE CRYSTAL TUBES OF BETA ALUMINA**

R. W. Stormont (Tyco Lab., Inc.), F. H. Cocks (Tyco Lab., Inc.),

and J. D. Giner (Tyco Lab., Inc.)

Dec. 1973 See also NASA-CR-121033

**LEWIS-11844**

Edge-defined, film-fed growth process allows both tubular shapes and single crystallinity to be achieved. Beta alumina in single crystal form makes possible membranes with improved conductivities. Single crystal membranes also eliminate problems associated with electrical short circuiting of membrane due to possible sodium metal diffusion.

**B73-10319****PREPARING THERMOPLASTIC AROMATIC POLYIMIDES**

V. L. Bell

Sep. 1973

**LANGLEY-11372**

Method prepares aromatic polyimides with significantly reduced glass-transition temperatures and without accompanying loss of high-level thermo-oxidative stability which has been typical. This has been made possible by use of diamine monomers with specific stereoisomeric features.

**B73-10328****ELECTROPHORESIS SEPARATOR COMBINING CENTRIFUGAL SEPARATION**

H. W. Semon (GE)

Oct. 1973

**M-FS-21396**

Centrifugal force causes buffer, chosen to be denser than particles, to move outward and particles to move inward. Electrophoresis force can be made to equal centrifugal force. System tends not to be affected by convection and other disturbances that are so troublesome in conventional electrophoresis systems.

**B73-10338****IMPROVED MOLD RELEASE FOR FILLED-SILICONE COMPOUNDS**

O. E. Accountius (Rockwell Intern. Corp.)

Sep. 1973

**JSC-19300**

Ceramic and filled-plastic materials used for fabrication of tiles are relatively brittle and easily break as they are being removed from molds. Dusting mold surfaces with commercially available glass microspheres provides mold release superior to existing spray releases. Glass-microsphere dusting also permits removal of uncured tile which has very little strength.

**B73-10339****DYNAMIC TECHNIQUE FOR MEASURING ADSORPTION IN A GAS CHROMATOGRAPH**

C. L. Deuel (Analytical Res. Labs. Inc.), N. W. Hultgren (Analytical

Res. Labs. Inc.), and M. L. Mobert (Analytical Res. Labs. Inc.)

Oct. 1973 See also NASA-CR-115202

**JSC-14083**

Gas-chromatographic procedure, together with mathematical analysis of adsorption isotherm, allows relative surface areas and adsorptive powers for trace concentrations to be determined in a few minutes. Technique may be used to evaluate relative surface areas of different adsorbates, expressed as volume of adsorbent/gram of adsorbate, and to evaluate their relative adsorptive power.

**B73-10341****TRANSPARENT POLYMERIC LAMINATES**

J. A. Parker, G. M. Fohlen, and P. M. Sawko

Aug. 1973

**ARC-10783**

Laminate prepared from epoxy-boroxine and phenolphthalein polycarbonate has high mechanical strength at elevated temperature and is resistant to impact, fire, and high-energy thermal radiation. Polycarbonate is prepared by reaction of phenolphthalein with phosgene in presence of amine catalyst and immiscible organic solvent phase.

**B73-10349****LOW-RESISTIVITY HOMOGENEOUS ELASTOMERS**

R. B. Somoano, Si.-P. S. Yen, and A. Rembaum

Aug. 1973

**NPO-11881**

Mixture of polyurethane polyelectrolyte and soluble, conducting organic compound produces homogeneous elastomer which has resistivity several orders of magnitude less than polyelectrolyte alone. Elastomeric material has novel resistivity dependence on temperature, that is, resistivity changes dramatically over narrow temperature range in vicinity of glass transition temperature.

**B73-10357****PARTICULATE AND AEROSOL DETECTOR**

W. H. Kinard, R. L. O'Neal, J. J. Wortman (Res. Triangle Inst.),

R. P. Donovan (Res. Triangle Inst.), A. D. Brooks (Res. Triangle

Inst.), and L. K. Monteith (Res. Triangle Inst.)

Oct. 1973

**LANGLEY-11434**

Particulate detector which monitors emissions from solid propellant fuels can monitor air quality. High signal-to-noise ratio detector can count aerosols and particles efficiently. Detector can distinguish one particle from another with respect to both time and energy of impact. Detector consists of accelerator, capacitor sensor, and readout recording equipment.

**B73-10371****THREE-DIMENSIONAL GAS TURBULENCE MEASUREMENT WITH A LASER-DOPPLER VELOCIMETER SYSTEM**

C. E. Fuller (Ramtech, Inc.)

Oct. 1973

**M-FS-22713**

Laser-Doppler system records gas-velocity data over wide dynamic range in three-dimensional space without physical probe. System detects shift in laser beam scattered by flowing particles and uses this frequency to calculate particle velocities. Technique is based on principle that laser beam scattered by flowing particles is shifted in frequency by amount proportional to laser frequency.

**B73-10372****MATERIALS DATA HANDBOOK ON TITANIUM 6AI-4V**

R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)

Oct. 1973

**M-FS-22796**

Handbook has been prepared which describes latest property information on titanium 6AI-4V. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures, supplemented with useful information in such areas as material procurement, metallurgy of alloy, corrosion, environmental effects, fabrication, and joining technology.

**B73-10373****MATERIALS DATA HANDBOOKS ON ALUMINUM ALLOYS**

R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)

Oct. 1973

**M-FS-22798**

Five handbooks have been prepared which describe up-to-date properties of the following wrought-aluminum alloys: 2014, 2219, 5456, 6061, and 7075. Each handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures.

**B73-10376****CATALYTIC REACTOR WITH DISPOSABLE CARTRIDGE**

C. M. McCullough (Appl. Electrochemistry, Inc.)

Sep. 1973

**ARC-10747**

Catalytic reactor, disposable cartridge enclosing iron catalyst, acts as container for solid carbon formed by decomposition of carbon monoxide. Deposition of carbon in other parts of oxygen recovery system does not occur because of lack of catalytic activity; filters trap carbon particles and prevent their being transported outside reaction zone.

**B73-10385****LONG-TERM MATERIAL COMPATIBILITY TESTING SYSTEM**

L. R. Toth, R. S. Weiner, D. C. Griffin, Jr., and R. W. Porter

Sep. 1973

**NPO-11776**

System includes procedure for hermetically sealing solid materials and fluids in glass ampoule and use of temperature-controlled facility containing sample holder, which permits sample containers to be retrieved safely and conveniently. Solid material and fluid are sealed within chemically-clean glass ampoule according to highly detailed procedure.

**B73-10388****BALSA WOOD AS AN ENERGY DISSIPATOR**

A. C. Knoell

Sep. 1973

**NPO-11839**

Studies have been undertaken to determine response of balsa wood in variety of environmental conditions. Response is dependent upon state of balsa wood as well as environment to which it is exposed, but certain combinations of conditions serve to increase significantly energy-dissipating capacity of wood relative to its normal capacity.

**B73-10394****AN EQUATION OF STATE FOR OXYGEN AND NITROGEN**

R. T. Jacobsen (Idaho Univ.), A. F. Myers (Idaho Univ.), and R. B. Stewart (Idaho Univ.)

Oct. 1973 See also NASA-CR-128525; NASA-CR-128527; NASA-CR-128528

**JSC-14465**

Recent measurements of thermodynamic properties of oxygen and nitrogen have provided data necessary for development of a single equation of state for both fluids. Data are available in summary report and two-part detailed study on thermodynamic properties of oxygen and nitrogen. Same data are used to develop vapor-pressure equation and heat-capacity equation.

**B73-10396****MATERIALS DATA HANDBOOK ON INCONEL ALLOY 718**

R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)

Oct. 1973

**M-FS-22793**

Handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures. This is supplemented with useful information in such areas as material procurement, metallurgy of alloy, corrosion, environmental effect, fabrication, and joining techniques. Design data are presented, as available.

**B73-10397****MATERIALS DATA HANDBOOKS ON STAINLESS STEELS**

R. F. Muraca (Western Appl. Res. and Develop., Inc.) and J. S. Whittick (Western Appl. Res. and Develop., Inc.)

Oct. 1973

**M-FS-22797**

Two handbooks which summarize latest available data have been published. Two types of stainless steels, alloy A-286 and Type 301, are described. Each handbook is divided into twelve chapters. Scope of information presented includes physical- and mechanical-property data at cryogenic, ambient, and elevated temperatures.

**B73-10400****LIGHTWEIGHT INFLATABLE MATERIAL WITH LOW PERMEABILITY**

E. C. White and F. R. Matthews

Oct. 1973

**LANGLEY-10928**

Material features combination of Mylar, for strength, and Saran, for impermeable qualities. Second lamination of Mylar prevents blocking, adds strength, and increases barrier rating. Different combinations of laminations produce variety of thicknesses and barrier ratings. Material can be metallized for increased barrier reliability and radar reflectivity, and can be treated with a heat-resistant coating.

**B73-10402****DESIGN OF A UNIT TO PRODUCE HOT DISTILLED WATER FOR THE SAME POWER CONSUMPTION AS A WATER HEATER**

R. A. Bambenek (Chemtrac Inc.) and P. P. Nuccio (Chemtrac Inc.)

Nov. 1973 See also NASA-CR-128878

**JSC-14224**

Unit recovers 97% of water contained in pretreated waste water. Some factors are: cleansing agent prevents fouling of heat transfer surface by highly concentrated waste; absence of dynamic seals reduces required purge gas flow rate; and recycle loop maintains constant flushing process to carry cleansing agent across evaporation surface.

**B73-10403****INTEGRATING-SPHERE COATING**

J. W. Stuart

Nov. 1973

**GSFC-11214**

Sodium chloride, used with proper solvent-dispersant combination, forms very durable reflective coatings. Several other inorganic salts, such as barium sulfate, barium carbonate, sodium

fluoride, potassium chloride, sodium hexafluorosilicate, and aluminum oxide, are also suitable. Sodium chloride may also be used with other formulations to produce same type of coating.

**B73-10406**  
**GAS CHROMATOGRAPHY OF VOLATILE ORGANIC COMPOUNDS**

A. Zlatkis (Houston Univ.)  
Dec. 1973  
JSC-14428

System has been used for problems such as analysis of volatile metabolites in human blood and urine, analysis of air pollutants, and in tobacco smoke chemistry. Since adsorbent is reusable after proper reconditioning, method is both convenient and economical. System could be used for large scale on-site sampling programs in which sample is shipped to central location for analysis.

**B73-10407**  
**RADIOCHEMICAL SYNTHESIS OF PURE ANHYDROUS METAL HALIDES**

W. H. Philipp, S. J. Marsik, and C. E. May  
Dec. 1973 See also B72-10439  
LEWIS-11860

Method uses radiation chemistry as practical tool for inorganic preparations and in particular deposition of metals by irradiation of their aqueous metal salt solutions with high energy electrons. Higher valence metal halide is dissolved in organic liquid and exposed to high energy electrons. This causes metal halide to be reduced to a lower valence metal halide.

**B73-10424**  
**ESTIMATING SORBER CAPACITY FOR MULTIPLE CONTAMINANTS**

T. M. Diccort (Lockheed Missiles & Space Co.) and R. A. Lamparter  
Dec. 1973 See also NASA-CR-2027  
LANGLEY-11056

Computer program estimates quantity of activated charcoal required to control multiple contaminants. Program scans all contaminants by potential parameter value and then orders them from lowest to highest values. It calculates quantity of sorbent required to remove most strongly adsorbed material; and then, using potential plot data, capacity of other materials is calculated on basis of corrected capacity.

**B73-10437**  
**AN AUTOMATED REMOTE MARSHLAND WATER-SAMPLING STATION**

D. F. Thomas  
Feb. 1974  
LANGLEY-11503

Station may be made to turn on and off remotely in response to radio, audio, photo, or other suitable signals, as well as by hard-wire switching. Station will remain operational under conditions of 4-foot tidal variations, along with 4-foot wave action, and will withstand hurricane-force winds without toppling over.

**B73-10447**  
**NEW METHOD FOR DETERMINING THERMOPHYSICAL PROPERTIES OF TEST SPECIMENS**

R. A. Jones  
Feb. 1974  
LANGLEY-11053

Model can be tested directly, which eliminates costly, time-consuming, and inaccurate method of making test models solely for purpose of determining thermophysical properties. Method is adaptable to numerous modifications and variations.

**B73-10453**  
**PROBABILITY OF STRESS-CORROSION FRACTURE UNDER RANDOM LOADING**

J. -N. Yang  
Jan. 1974  
NPO-13113

Mathematical formulation is based on cumulative-damage hypothesis and experimentally-determined stress-corrosion

characteristics. Under both stationary random loadings, mean value and variance of cumulative damage are obtained. Probability of stress-corrosion fracture is then evaluated, using principle of maximum entropy.

**B73-10457**  
**HIGH-TEMPERATURE GAS/LIQUID STRESS RELAXOMETERS**

S. H. Kalfayan and R. H. Silver  
Mar. 1974  
NPO-13168

Two relaxometers allow testing of elastomers in various fluids. First relaxometer uses fork-like loading spacer interposed between loading lever and support ring, so that sample is stretched predetermined amount. In second relaxometer, degree of initial elongation is set by means of adjustable collar, which, when locked in place on piston rod, enables sample to be stretched predetermined length.

**B73-10469**  
**ULTRAVIOLET REFLECTIVE COATING**

J. B. Schutt  
Mar. 1974  
GSFC-11786

Composition consists of dispersion of barium sulphate in aqueous solution of water-soluble inorganic binder. Binder is selected from group consisting of alkali metal sulphates. Coating exhibits high reflectance of ultraviolet light to wavelengths of approximately 200.0 nm, which compares favorably with high reflectance of virgin barium sulphate powder.

**B73-10475**  
**VAPOR-DEPOSITED PLATINUM AS A FUEL-CELL CATALYST**

W. J. Asher (Exxon Corp.) and J. S. Batzold (Exxon Corp.)  
Mar. 1974 See also B73-10472; B73-10473; B73-10489  
M-FS-21317

Electrodes are prepared by vacuum deposition of platinum on nickel substrate with conventional vapor-deposition apparatus. Amount of platinum loaded on substrate can be varied by changing exposure time during deposition. These electrodes are significantly more effective than conventional oxygen electrodes.

**B73-10481**  
**WELDING HIGH-STRENGTH ALUMINUM ALLOYS**

P. G. Parks, R. V. Hoppes, E. A. Hasemeyer, and K. Masubuchi (MIT)  
Mar. 1974  
M-FS-22918

Handbook has been published which integrates results of 19 research programs involving welding of high-strength aluminum alloys. Book introduces metallurgy and properties of aluminum alloys by discussing commercial alloys and heat treatments. Several current welding processes are reviewed such as gas tungsten-arc welding and gas metal-arc welding.

**B73-10483**  
**TRANSFER OF GASEOUS OXYGEN FROM HIGH-PRESSURE CONTAINERS AND THE JOULE-THOMSON INVERSION**

E. R. Schumann (Bendix Corp.)  
Mar. 1974  
KSC-10721

From the experiments performed in study, it was determined that oxygen transferred at ambient temperature and pressures up to 10,000 psig consistently dropped in temperature. All results therefore indicate that gaseous oxygen transferred at ambient temperature does not exhibit Joule-Thomson inversion below 10,000 psig.

**B73-10503**  
**SOIL MOISTURE BY EXTRACTION AND GAS CHROMATOGRAPHY**

E. L. Merek and G. C. Carle  
Dec. 1973  
ARC-10748

## 04 MATERIALS/CHEMISTRY

To determine moisture content of soils rapidly and conveniently extract moisture with methanol and determine water content of methanol extract by gas chromatography. Moisture content of sample is calculated from weight of water and methanol in aliquot and weight of methanol added to sample.

**B73-10504**

### REUSABLE SILICA SURFACE-INSULATION MATERIAL

H. E. Goldstein, M. Smith, and D. Leiser  
Dec. 1973 See Also NASA-TM-X-2719

**ARC-10721**

Material was specifically developed for manufacture of insulating tiles, but it can be molded into other shapes as required. Basic raw materials are high-purity silica fiber, fumed-silica powder, and reagent-grade starch. Only purest materials are used, and care must be taken to avoid contamination during processing.

**B73-10505**

### POLYIMIDE FIBER-GLASS COMPOSITE RESISTS HIGH TEMPERATURES

W. J. Gilwee, R. W. Rosser, and J. A. Parker  
Dec. 1973

**ARC-10782**

Composites synthesized from bismaleimide have superior strength and oxidation resistance at elevated temperatures when compared with similar composites prepared with epoxy or silicon polymers of similar cost. Polyimide synthesis technique and processing method yield essentially void-free fiber-glass reinforced composites.

**B73-10507**

### MOISTURE-RESISTANT COATINGS FOR OPTICAL COMPONENTS

J. R. Hollahan, T. Wydeven, and C. C. Johnson  
Dec. 1973 See also B72-10710

**ARC-10749**

Plasma polymerization technique is used to apply thin, adherent, hydrophobic coatings from chlorotrifluoroethylene monomer. Apparently much of the chlorine contained in original monomer is lost during polymerization, and characteristic C-Cl absorption in infrared region is essentially absent.

**B73-10522**

### SILICON ON SAPPHIRE FOR ION IMPLANTATION STUDIES

B. P. Pisciotto  
Mar. 1974

**LANGLEY-11415**

Van der Pauw or bridge samples are ultrasonically cut from silicon on sapphire wafers. Contact pad regions are implanted with moderately heavy dose of ions. Ion of interest is implanted into sample; and, before being annealed in vacuum, sample is sealed with sputtered layer of silicon dioxide. Nickel or aluminum is sputtered onto contact pad areas and is sintered in nitrogen atmosphere.

**B73-10527**

### SELECTIVE COATING FOR COLLECTING SOLAR ENERGY ON ALUMINUM

J. R. Lowery  
Mar. 1974

**M-FS-22562**

Presently used coatings, which were originally developed for brass, copper, and steel substrates, yield relatively low absorptance/emittance ratios when applied to aluminum. Efficient, black-nickel plating applied to aluminum substrate enhances solar absorptance to 93% and reduces emittance to 6%.

**B73-10033**

### MATHEMATICAL MODEL FOR PREDICTING HUMAN VERTEBRAL FRACTURE

J. V. Benedict (Technol. Inc.)  
Feb. 1973 See also NASA-CR-114452

**ARC-10691**

Mathematical model has been constructed to predict dynamic response of tapered, curved beam columns in as much as human spine closely resembles this form. Model takes into consideration effects of impact force, mass distribution, and material properties. Solutions were verified by dynamic tests on curved, tapered, elastic polyethylene beam.

**B73-10045**

### RAPID DETECTION OF BACTERIA IN FOODS AND BIOLOGICAL FLUIDS

R. D. Fealey and W. Renner  
Feb. 1973

**GSFC-11738**

Simple and inexpensive apparatus, called 'redox monitoring cell,' rapidly detects presence of bacteria. Bacteria is detected by measuring drop in oxygen content in test solution. Apparatus consists of vial with two specially designed electrodes connected to sensitive voltmeter.

**B73-10046**

### AN ECONOMICAL ARTERIAL-PULSE-WAVE TRANSDUCER

C. Kim, D. Gorelick, and W. Chen  
Feb. 1973

**GSFC-11531**

Transducer records arterial pulses externally. Device uses thin plastic membrane which is fluid coupled to pressure sensitive transistor. Transistor is connected to amplifier which, in turn, is connected to recorder. End section is threaded to accept suitable holder and contains pressure relief vent allowing transistor to sense only pressure levels greater than atmospheric.

**B73-10048**

### FLEXIBLE ELECTROENCEPHALOGRAM (EEG) HEADBAND

L. J. Raggio (N. Am. Rockwell Corp.)  
Feb. 1973

**LANGLEY-10927**

Headband incorporates sensors which are embedded in sponges and are exposed only on surface that touches skin. Electrode sponge system is continually fed electrolyte through forced feed vacuum system. Headband may be used for EEG testing in hospitals, clinical laboratories, rest homes, and law enforcement agencies.

**B73-10078**

### LIMITED TACTILE STIMULUS FOR PROSTHETIC HANDS

W. L. Scott (Rockwell Intern. Corp.)  
Mar. 1973

**M-FS-16570**

Heat and pressure transducers mounted in prosthetic hand permit wearer to sense temperature and pressure to which hand is subjected.

**B73-10089**

### ARTIFICIAL ATMOSPHERE CONTROL SYSTEM

D. R. Rebert (McDonnell Douglas Corp.), M. E. Peeples (McDonnell Douglas Corp.), J. D. Fuller and (McDonnell-Douglas Corp.),  
Feb. 1973

**M-FS-22159**

Two-gas control system has been developed which uses existing hardware. Three systems are used for control, monitoring, and safety backup. Pure oxygen will be supplied to maintain safe pressure level should something go wrong.

**B73-10092**

### PRESERVATION OF FLAVOR IN FREEZE DRIED GREEN BEANS

C. S. Huber (Technol. Inc.), N. D. Heidelbaugh (Technol. Inc.), and D. Davis (Technol. Inc.)  
Mar. 1973

## 05 LIFE SCIENCES

**JSC-14149**

Before freeze drying, green beans are heated to point at which their cell structure is altered. Beans freeze dried with altered cell structure have improved rehydration properties and retain color, flavor, and texture.

**B73-10099**

**PORTABLE LIGHT DETECTION SYSTEM FOR THE BLIND**  
R. L. Wilber (Southwest Res. Inst.) and B. L. Carpenter (Southwest Res. Inst.)  
Feb. 1973  
**M-FS-22403**

System can be used to detect 'ready' light on automatic cooking device, to tell if lights are on for visitors, or to tell whether it is daylight or dark outside. Device is actuated like flashlight. Light impinging on photo cell activates transistor which energizes buzzer to indicate presence of light.

**B73-10156**

**A PRACTICAL SOLAR ENERGY HEATING AND COOLING SYSTEM**  
M. J. O'Neill (Lockheed Aircraft Corp.), A. J. McDanal (Lockheed Aircraft Corp.), and W. H. Sims (Lockheed Aircraft Corp.)  
May 1973  
**M-FS-22563**

Recent study has concluded that solar-powered residential heating and cooling system is non technically and economically feasible. Proposed system provides space heating, air conditioning, and hot water. Installation costs will be greater than for conventional heating systems, but this difference will eventually be defrayed by very low operating costs.

**B73-10177**

**POTASSIUM FOOD SUPPLEMENT**  
C. T. Bourland (Technol. Inc.), C. S. Huber (Technol. Inc.), C. Rambaut, and N. D. Heidelbaugh  
Jun. 1973  
**JSC-14391**

Potassium gluconate is considered best supplementary source for potassium. Gluconate consistently received highest taste rating and was indistinguishable from nonsupplemented samples. No unfavorable side effects were found during use, and none are reported in literature. Gluconate is normal intermediary metabolite that is readily adsorbed and produces no evidence of gastrointestinal ulcerations.

**B73-10198**

**REPRODUCTIVE CELL SEPARATION: A CONCEPT**  
A. J. Cutaia (Battelle Mem. Inst.)  
Aug. 1973  
**M-FS-22627**

Attempt has been made to separate mammalian male (Y) bearing sperm from female (X) bearing sperm. Both types of sperm are very dependent on gravity for their direction of movement. Proposed concept suggests electrophoretic force of suitable magnitude and direction may be effective means of separating X and Y sperm under zero gravity.

**B73-10220**

**INSULATED ECG ELECTRODES**  
W. M. Portnoy (Tex. Technol. Univ.) and R. M. David (Tex. Technol. Univ.)  
Jun. 1973 See also NASA-CR-115530  
**JSC-14339**

Insulated, capacitively coupled electrode does not require electrolyte paste for attachment. Other features of electrode include wide range of nontoxic material that may be employed for dielectric because of sputtering technique used. Also, electrode size is reduced because there is no need for external compensating networks with FET operational amplifier.

**B73-10222**

**BACTERIAL CONTAMINATION MONITOR**  
E. Rich and N. H. MacLeod  
Aug. 1973  
**GSFC-10879**

Economical, simple, and fast method uses apparatus which detects bacteria by photography. Apparatus contains camera, film assembly, calibrated light bulb, opaque plastic plate with built-in reflecting surface and transparent window section, opaque slide, plate with chemical packages, and cover containing roller attached to handle.

**B73-10229**

**AUTOMATIC MICROBIAL TRANSFER**  
J. R. Wilkins and S. M. Mills  
Aug. 1973  
**LANGLEY-11354**

Device can transfer metabolites or inhibitory agents to broth cultures of bacteria, in various stages of growth, for study. It also has application in transfer of other micro-organisms, such as yeasts, and could be useful in clinical and research laboratories. Device has been used for wide variety of purposes in experimental situations.

**B73-10241**

**MEASURING MICRO-ORGANISM GAS PRODUCTION**  
J. R. Wilkins, A. O. Pearson, and S. M. Mills  
Aug. 1973  
**LANGLEY-11326**

Transducer, which senses pressure buildup, is easy to assemble and use, and rate of gas produced can be measured automatically and accurately. Method can be used in research, in clinical laboratories, and for environmental pollution studies because of its ability to detect and quantify rapidly the number of gas-producing microorganisms in water, beverages, and clinical samples.

**B73-10270**

**IMPROVED FORMAT FOR RADIOCARDIOGRAPHIC DATA**  
J. Dimeff and G. Sevelius  
Jul. 1973  
**ARC-10742**

Technique involves introduction of radioactive sample into antecubital vein. Scintillation crystal mounted in collimating housing views portion of right and left hearts. As radioactive sample passes through heart, counting rate is measured by crystal and recorded on strip chart. Data is insensitive to geometric effects and other parameters.

**B73-10272**

**NEW SYSTEM FOR BATHING BEDRIDDEN PATIENTS**  
J. E. Greenleaf, R. A. Staley, and P. A. Payne  
Aug. 1973  
**ARC-10745**

Multithead shower facility can be used with minimal patient handling. Waterproof curtain allows patient to bathe with his head out of shower. He can move completely inside shower to wash his face and hair. Main advantage of shower system is time saved in giving bath.

**B73-10320**

**EIGHT-CHANNEL TELEPHONE TELEMETRY SYSTEM**  
R. Smith (SCI Systems, Inc.) and T. Carr (SCI Systems, Inc.)  
Sep. 1973 See also NASA-CR-128877  
**JSC-14452**

Portable telemetry system uses conventional telephone link which eliminates mailing or messenger service between physician and analyst. Transmitter is used by physician; receiver is used by analyst. Each unit is inductively coupled to its respective telephone set, transmitter converting EEG into audio frequency and receiver converting this frequency back to EEG.

**B73-10359**

**DYE LASER REMOTE SENSING OF MARINE PLANKTON**  
P. B. Mumola, O. Jarrett, Jr., and C. A. Brown, Jr.  
Oct. 1973  
**LANGLEY-11382**

Dye laser, emitting four wavelengths sequentially in time, has been incorporated into helicopter-borne lidar flight package, for performing studies of laser-induced fluorescence of chlorophyll A in algae. Data obtained by multicolor lidar technique can provide

water-resource management with rapid-access wide-area coverage of the impact of various environmental factors for any body of water.

**B73-10377**

**UNIFIED LIFE DETECTION SYSTEM: A CONCEPT**

J. P. Martin (Martin Marietta Corp.) and M. E. Crissey (Martin Marietta Corp.)  
Sep. 1973

**ARC-10769**

Systematic investigation of techniques and hardware which could be utilized in life detection system has resulted in identification of group of candidate concepts and selection of 'unified system'. Theme of concept permits greatest flexibility in procedural details for experiments which can be performed in individual ampules.

**B73-10404**

**APPLICATION OF BIOLOGICAL FILTERS IN WATER TREATMENT SYSTEMS**

T. L. Hurley (Chemtrac Inc.) and R. A. Bambenek (Chemtrac Inc.)

Nov. 1973 See also NASA-CR-128878

**JSC-14226**

Silver chloride placed on or close to barrier kills bacteria as they arrive. Dead bacteria accumulate linearly, whereas previously, live bacteria accumulated exponentially. During continuous 30-day tests, no bacteriological contamination was found downstream of filters with silver chloride added.

**B73-10428**

**DESIGN FOR WASTE-MANAGEMENT SYSTEM**

C. A. Guarneri (Grumman Aerospace Corp.), A. Reed (Grumman Aerospace Corp.), and R. Renman (Grumman Aerospace Corp.)  
Dec. 1973 See also NASA-CR-128857; NASA-CR-128858

**JSC-14486**

Study was made and system defined for water-recovery and solid-waste processing for low-rise apartment complexes. System can be modified to conform with unique requirements of community, including hydrology, geology, and climate. Reclamation is accomplished by treatment process that features reverse-osmosis membranes.

**B73-10436**

**SYSTEM FOR MEASURING PASSENGER REACTION TO TRANSPORTATION-VEHICLE VIBRATION**

S. A. Clevenson, A. C. Dibble, J. K. Lusby, Jr., H. F. Scholl, and D. G. Stephens  
Feb. 1974

**LANGLEY-11353**

Equipment is capable of measuring frequencies from 0 to 50 Hz and is portable, light, inexpensive, and easily adaptable to field operations. System could be used in situations where it is necessary to record simultaneously subject response to other types-of physical measurement or stimuli, such as temperature, noise, or pressure.

**B73-10448**

**MOTIVATION TECHNIQUES FOR SUPERVISION**

N. D. Gray (Rockwell Intern. Corp.)

Feb. 1974

**JSC-19187**

Guide has been published which deals with various aspects of employee motivation. Training methods are designed to improve communication between supervisors and subordinates, to create feeling of achievement and recognition for every employee, and to retain personal confidence in spite of some negative motivators. End result of training is reduction or prevention of errors.

**B73-10474**

**BIODETECTION GRINDER**

F. J. Beyerle

Mar. 1974

**M-FS-22833**

Grinder, which employs shearing action with minimum energy

input, obtains desired particle sizes in materials ranging from soft plastics to hard rocks. Modified version of this grinder might be used in hospitals and biological laboratories involved with bacteriological research and testing.

**B73-10477**

**CARDIOTACHOMETER DISPLAYS HEART RATE ON A BEAT-TO-BEAT BASIS**

J. R. Rasquin, H. E. Smith, and R. A. Taylor

Mar. 1974

**M-FS-20284**

Electronics for this system may be chosen so that complete calculation and display may be accomplished in a few milliseconds, far less than even the fastest heartbeat interval. Accuracy may be increased, if desired, by using higher-frequency timing oscillator, although this will require large capacity registers at increased cost.

**B73-10492**

**MINIATURIZED HAPLOSCOPE FOR TESTING BINOCULAR VISION**

T. A. Decker (Baylor Coll. of Med.)

Dec. 1973

**ARC-10759**

Device can reproduce virtually all binocular stimulus conditions (target configuration, vergence angle, and accommodative distance) used to test binocular performance. All subsystems of electronic controls are open-loop and solid-state-controlled and, with the exception of vergence angle drive, utilize dc stepping motors as prime movers. Arrangement is also made for readouts of each variable.

**B73-10494**

**COMPUTER SYSTEM FOR MONITORING RADIORESPIROMETRY DATA**

D. D. Feller, E. D. Neville, and A. O. Cole

Dec. 1973

**ARC-10784**

System monitors expired breath patterns simultaneously from four small animals after they have been injected with carbon-14 substrates. It has revealed significant quantitative differences in oxidation patterns of glucose following such mild treatments of rats as a change in diet or environment.

**B73-10495**

**INTEGRAL AIRCRAFT PASSENGER SEAT**

C. C. Kubokawa

Dec. 1973 See also B72-10692

**ARC-10799**

Human-engineering approach was used to design integral seat which provides all the safety, comfort, and protective features that can possibly be afforded airline passengers. Results of dynamic impact testing indicated that seat can withstand and attenuate gravity loads of 21-g horizontal and 45-g vertical; by design, seat will withstand lateral g's as well.

**B73-10498**

**FLEXIBLE TEMPERATURE PROBE FOR BIOLOGICAL SYSTEMS**

P. J. Haro, C. Winget, and J. R. Beljan (Calif. Univ., Davis)

Dec. 1973

**ARC-10796**

Probe is sufficiently flexible so that it can be worn comfortably for long periods of time, but relatively rigid to permit easy insertion. Body and electrical leads of small thermistor are imbedded in flexible fluorosilicone matrix contained in vinyl plastic tubing.

**B73-10523**

**DETECTING AND MEASURING METABOLIC BYPRODUCTS BY ELECTROCHEMICAL SENSING**

J. R. Wilkins and G. E. Stoner (Virginia Univ.)

Mar. 1974

**LANGLEY-11525**

Method of detecting certain groups of bacteria is based on sensing buildup in molecular hydrogen. Apparatus is easy to assemble and use, and it has added advantage that hydrogen

evolution by test micro-organisms can be measured automatically and accurately. System has been used to detect and enumerate variety of gram-negative bacteria of enterobacteriaceae group.

## 06 MECHANICS

**B73-10023**  
**SATELLITE AUXILIARY PROPULSION SYSTEMS**  
 L. B. Holcomb  
 Jan. 1973 See also JPL-TR-32-1505  
**NPO-11744**

Report is announced which describes techniques for selecting optimum system for specific satellite mission. Descriptions of propulsion systems are presented along with illustrations and diagrams. Report contains references, cost-effectiveness techniques, and reliability measurements and estimates.

**B73-10026**  
**MAGNETIC LATCHING VALVE**  
 J. M. Conley  
 Jan. 1973  
**NPO-11790**

Latching, fast-acting 2-port poppet valve has been developed for use in gas chromatograph - mass spectrometer combinations. Requisites included positive actuation time, few hundredths of a second, and static force holding valve in position at all times.

**B73-10028**  
**FLUID INSULATION TO PREVENT ICE FORMATION IN HEAT EXCHANGERS**  
 G. A. Coffinberry (GE)  
 Mar. 1973  
**LEWIS-11969**

Heat transfer surfaces were insulated to maintain air side surface temperature above freezing. Double wall tubes, with annular space between tubes, were filled with static liquid hydrogen. Low thermal conductivity of this hydrogen provided thermal resistance.

**B73-10029**  
**BIMETALLIC DEVICES FOR STIRRING FLUIDS**  
 T. N. Canning  
 Feb. 1973  
**ARC-10441**

Device consists of helical heating coil inside cylinder and affixed at one end. Piston is fastened at other end and is free to move axially through cylinder. Electrical power extends coil when applied to conductors. Bimetallic stirrer may also be made in vane form.

**B73-10034**  
**MECHANICAL POSITIONING DEVICE FOR LANGMUIR PROBE**  
 C. W. Perkins  
 Feb. 1973  
**NPO-11626**

Lightweight, portable device has been developed to permit probe movement in two planes. It also provides accurate information about location of probe tip in a closed chamber.

**B73-10041**  
**MAGNETIC PARTICLE CLUTCH CONTROLS SERVO SYSTEM**  
 P. B. Fow (Rockwell Intern. Corp.)  
 Mar. 1973  
**JSC-17136**

Magnetic clutches provide alternative means of driving low-power rate or positioning servo systems. They may be used over wide variety of input speed ranges and weigh comparatively

little. Power drain is good with overall motor/clutch efficiency greater than 50%, and gain of clutch is close to linear, following hysteresis curve of core and rotor material.

**B73-10042**  
**TRAVELING DIGITAL COUNTERS FOR MICROMETERS**  
 C. T. Haley and J. M. Moore  
 Feb. 1973  
**LANGLEY-11258**

Five digit micrometer readings are made directly and quickly with no loss of precision. It is virtually impossible for micrometer to be misread. Digitized micrometer can also be used for repetitive measurements.

**B73-10057**  
**DYNAMIC TESTING OF COMPLEX STRUCTURES**  
 C. Birs (Grumman Aerospace Corp.) and P. Anderson (Grumman Aerospace Corp.)  
 Mar. 1973  
**JSC-12569**

Response of structure is determined under impulses large enough to create severe strains. Electrodynamic shaker can provide impulses to nearly any point on structure and can deliver repeated pulses of varying force and duration.

**B73-10059**  
**MECHANICAL IMPEDANCE AND ACOUSTIC MOBILITY MEASUREMENT TECHNIQUES OF SPECIFYING VIBRATION ENVIRONMENTS**  
 G. C. Kao (Wyle Labs.)  
 Feb. 1973  
**M-FS-22016**

Method has been developed for predicting interaction between components and corresponding support structures subjected to acoustic excitations. Force environments determined in spectral form are called force spectra. Force-spectra equation is determined based on one-dimensional structural impedance model.

**B73-10061**  
**MEASUREMENT OF DIMENSIONS AND ALIGNMENT WITH OPTICAL INSTRUMENTS**  
 W. F. Dendy  
 Feb. 1973  
**M-FS-22168**

Course, as contained in manual, encompasses principles involved in determining and applying proper optical tooling devices to fulfill precise measuring requirements.

**B73-10076**  
**THERMAL-DYNAMIC MODELING STUDY**  
 I. U. Ojalvo (Grumman Aerospace Corp.)  
 Mar. 1973 See also NASA-CR-2125  
**LANGLEY-11309**

Study provides basic information for designing models and conducting thermal-dynamic structural tests. Factors considered are development and interpretation of thermal-dynamic structural scaling laws; identification of major problem areas; and presentation of model fabrication, instrumentation, and test procedures.

**B73-10111**  
**A VERSATILE FLAMMABILITY TEST CHAMBER**  
 C. L. Springfield, W. J. Paton, and J. D. Jeter  
 May 1973  
**KSC-10126**

Relatively inexpensive test chamber safely tests flammability of most materials while allowing constant observation of test. Chamber can be used at various pressures, under controlled atmosphere, and is equipped with probes to vary distance from heat source to test object or to move it for observation from several different angles.

**B73-10117**  
**PARTICLE-FLUID INTERACTIONS FOR FLOW MEASUREMENTS**  
 N. S. Berman (Arizona State Univ.)

Mar. 1973  
M-FS-21727

Study has been made of the motion of single particle and of group of particles, emphasizing solid particles in gaseous fluid. Velocities of fluid and particle are compared for several conditions of physical interest. Mean velocity and velocity fluctuations are calculated for single particle, and some consideration is given to multiparticle systems.

**B73-10128**  
**DETECTOR FOR INSPECTION OF FIRE ALARMS**

G. T. Clawson  
Mar. 1973  
GSFC-11600

Portable detector tests rate-of-rise temperature devices. Incandescent light bulb is calibrated to produce rate of temperature rise necessary to activate properly functioning alarm.

**B73-10150**  
**A SIMPLE, ACCURATE DEPTH CHECK GAUGE**

E. P. Rauch (Rockwell Intern. Corp.)  
May 1973  
JSC-17166

Easily made, pen-light battery operated production check gauge has probe-activated switch with fail-safe features to insure proper operation. Parts can be reliably and quickly checked. Gauge is equipped with tolerance band adjustment and can use interchangeable probes for different applications. Accompanying tester permits frequent check of calibration.

**B73-10183**  
**THEORETICAL PREDICTION OF INTERFERENCE LOADING ON AIRCRAFT STORES: PART II -- SUPERSONIC SPEEDS**

C. H. Fox, Jr. and F. Fernandes (Gen. Dynamics Corp.)  
Jun. 1973 See also B73-10184  
LANGLEY-11250

Linear theory is used, without two dimensional or slender body assumptions, to predict flow field produced by aircraft wing, nose, inlet, and pylons. Aircraft shock wave locations are predicted, and their effect on flow field is included through transformation of aircraft geometry. Program was written in FORTRAN IV for CDC 6400 computer.

**B73-10184**  
**THEORETICAL PREDICTION OF INTERFERENCE LOADING ON AIRCRAFT STORES: PART I - SUBSONIC SPEEDS**

C. H. Fox, Jr. and F. Fernandes (Gen. Dynamics Corp.)  
Jun. 1973 See also B73-10183  
LANGLEY-11249

Computer program is developed for theoretically predicting loading on pylon-mounted stores in subsonic compressible flow. Linear theory predicts flow field produced by aircraft wing, nose, inlet, and pylons. Program was written in FORTRAN IV for CDC 6000 computer.

**B73-10200**  
**AIR-ATOMIZING SPLASH-CONE FUEL NOZZLE REDUCES POLLUTANT EMISSIONS FROM TURBOJET ENGINES**

R. D. Ingebo and C. T. Norgren  
Nov. 1973 See also NASA-TN-D-7154  
LEWIS-11918

Advantages of fuel nozzle over conventional pressure-atomizing fuel nozzles: simplicity of construction, ability to distribute fuel-air mixture uniformly across full height of combustor without using auxiliary air supply, reliability when using contaminated fuels, and durability of nozzle at high operating temperatures.

**B73-10201**  
**A SELF-SUPPORTING STRAIN TRANSDUCER**

I. S. Hoffman  
Jun. 1973  
LANGLEY-11263

Self-contained mechanical measuring system is handmounted by simply compressing installation spring and inserting device into hole of matching size. It is self-aligning as each contact

pin maintains constant contact with surface being measured. Strain level is controlled by design to provide for measurements over almost unlimited number of load cycles.

**B73-10205**  
**BRAZE ALLOYS FOR HIGH TEMPERATURE SERVICE**

R. A. Lindberg, R. L. McKisson (Rockwell Intern. Corp.), and G. Erwin, Jr. (Rockwell Intern. Corp.)  
Jun. 1973 See also NASA-CR-1591; NASA-CR-1592; NASA-CR-54093; NASA-CR-72850; NASA-CR-120831  
LEWIS-11374

Two groups of refractory metal compositions have been developed that are very useful as high temperature brazing alloys for sealing between ceramic and metal parts. Each group consists of various compositions of three selected refractory metals which, when combined, have characteristics required of good braze alloys.

**B73-10207**  
**MASS FLOW CONTROLLER FOR GASEOUS PROPELLANTS**

Innovator not given (Parker Hannifin Corp.) Jun. 1973 See also NASA-CR-128639  
JSC-14221

Gaseous propellants exhibit large variations in pressure and temperature and hence in fuel delivery. All-mechanical, mass flow controller which compensates for these variations has been developed to maintain constant fuel rate of gas. Further work is necessary to ease inlet pressure limitation.

**B73-10230**  
**FLUIDIC DEVICE FOR MEASURING CONSTITUENT MASSES OF A FLOWING BINARY GAS MIXTURE**

P. R. Prokopius  
Nov. 1973 See also NASA-TM-X-1269; NASA-TM-X-2741  
LEWIS-11995

Device consists of fluidic humidity sensor and specially designed flow calorimeter. Calorimeter provides readings of gas stream temperature rise produced by measured amount of heat that is dissipated into gas stream, and humidity sensor is used to obtain continuous calculation of specific heat capacity of gas mixture.

**B73-10234**  
**HIGH-FRICTION MECHANICAL GRIPS**

E. G. Stevens (Rockwell Intern. Corp.)  
Aug. 1973  
JSC-19260

Plasma-arc spraying offers method of preparing required surface at greatly reduced cost. Coarse-grained, tungsten carbide bonded-nickel coating is applied by spraying. Coating has been used successfully on wedge-shaped mechanical test grips.

**B73-10239**  
**METHOD FOR PREDICTING ROTOR FREE-WAKE POSITIONS AND THE RESULTING ROTOR BLADE AIRLOADS**

D. Deen, W. R. Mantay, and S. G. Sadler (Rochester Appl. Res. Assoc., Inc.)  
Aug. 1973  
LANGLEY-10674

Computer program has been designed and written to predict rotor free-wake positions and resulting rotor blade airloads without requiring time-consuming and tedious calculations. This program was written in FORTRAN IV for use on an IBM-360 computer.

**B73-10240**  
**BONDED PANEL, FLAW DETECTION STANDARDS**

R. J. Platt, Jr., L. B. Thurston, Jr., and R. M. Baucom  
Aug. 1973  
LANGLEY-11399

With optical holography or ultrasonic equipment, process prepares standards for use in detection of flaws in bonded panels. Metal-to-metal, composite-to-metal, and composite-to-composite flaw standards have been produced by this process, and all have been used and tested successfully.

**B73-10276**  
**OPTIMIZATION OF STRUCTURES ON THE BASIS OF**

**FRACTURE MECHANICS AND RELIABILITY CRITERIA**

E. Haer and J. -N. Yang  
 Jun. 1973 See also NASA-CR-116827  
**NPO-11645**

Systematic summary of factors which are involved in optimization of given structural configuration is part of report resulting from study of analysis of objective function. Predicted reliability of performance of finished structure is sharply dependent upon results of coupon tests. Optimization analysis developed by study also involves expected cost of proof testing.

**B73-10325**  
**ACOUSTIC-EMISSION SIGNAL-PROCESSING ANALOG UNIT FOR LOCATING FLAWS IN LARGE TANKS**

F. J. Moskal (Rockwell Intern. Corp.) and J. D. Fageol (Rockwell Intern. Corp.)  
 Sep. 1973

**M-FS-24424**

Technique monitors structural flaws in 105-in. diameter tanks. Tank surface is divided into many areas and each area is sectioned into 20 equilateral triangles that form icosahedron. Twelve transducers are equally positioned on tank surface at vertex of each triangle. Transducers monitor area for flaws by detecting any increase in acoustical activity.

**B73-10326**  
**ARTICULATED ELASTIC-LOOP ROVING VEHICLES**

C. J. Chang (Lockheed Corp.) and W. Trautwein  
 Oct. 1973

**M-FS-22691**

Prototype vehicle features exceptional obstacle-negotiating and slope-climbing capabilities plus high propulsive efficiency. Concept should interest designers of polar or ocean-bottom research vehicles. Also, its large footprint and low ground pressure will minimize ecological damage on terrain with low bearing strength, as in off-the-road application.

**B73-10332**  
**A MULTIDEGREE-OF-FREEDOM VIBRATIONAL APPARATUS**

J. J. Kerley, Jr. and N. C. Schaller  
 Sep. 1973

**GSFC-11302**

Apparatus uses prestressed cables to support vibrational table. Cables are durable, do not require frequent servicing, and provide increased safety. Because much weight rests on these cables, vibration actuating pistons can provide longer service. In event of structural failure of other supporting components, they will support entire weight of vibrational table.

**B73-10347**  
**THERMALLY ACTUATED VALVE**

R. H. Silver  
 Aug. 1973

**NPO-11846**

Effective seal in one-shot valve is made by shrink-fitting ball within cylinder; thermal expansion of cylinder, caused by contiguous source of heat, will release ball and open valve. Valve can also be adapted for repeated operation and made capable of being opened without pressurized fluid.

**B73-10348**  
**HEATED BIMETAL STRIP PREVENTS DAMAGE OF BEARINGS BY VIBRATION**

L. J. Derr  
 Aug. 1973

**NPO-11870**

Strip of bimetal is shaped as split ring; when properly fabricated from thin sheet, width of strip increases when it is heated. When width of strip increases, outer races are forced apart, thus pressing balls tightly against inner races. Strip applies axial load to bearing, amount of load being function of temperature to which strip is heated.

**B73-10364**  
**STRUCTURAL HEAT PIPE**

S. Ollendorf  
 Oct. 1973  
**GSFC-11619**

When solar heat is absorbed through the structural support member it is fed directly to a heat pipe. Energy is transferred by heat pipe around to a cooler spot before it can find its way to the structure. This prevents local hot spots from occurring on the sun side and excessive heat leaks on the dark side.

**B73-10380**  
**LOW-CLOSING-FORCE SEAL**

L. E. Bergquist (Martin Marietta Corp.)  
 Sep. 1973

**ARC-10775**

Compress soft, inert metal gasket between cone and corresponding socket to attach tubes to vessels containing gas samples. Technique effects seals with minimum of applied force and does not contaminate contents. Seal is formed when port connector is pushed firmly into its socket. Gold washer is deformed and forced to flow into imperfections in surfaces.

**B73-10395**  
**ISOGRID DESIGN HANDBOOK**

R. R. Meyer (McDonnell Douglas Corp.), O. P. Harwood (McDonnell Douglas Corp.), M. B. Harmon (McDonnell Douglas Corp.), and J. I. Orlando (McDonnell Douglas Corp.)

Oct. 1973

**M-FS-22686**

Handbook has been published which presents information needed for design of isogrid triangular integral-stiffened structures. It develops equations, methods, and graphs to handle wide variety of loadings, materials, and geometry. Handbook is divided into seven sections. Handbook may be used by marine and civil engineers and by students and designers without access to computers.

**B73-10398**  
**INDUSTRIAL FILTER BAGS CLEANED BY HIGH-FREQUENCY VIBRATION: A CONCEPT**

A. V. Kooy (Rockwell Intern. Corp.)  
 Nov. 1973

**M-FS-24445**

System holds filter bag around fine-mesh metal screen and vibrates screen at its resonant frequency. This removes deposited byproducts and protects bag fibers from damaging forces. Because filter bags represent 20 to 40% of any industrial filtering investment, this method of extending bag life should be of interest to those responsible for plant maintenance.

**B73-10405**  
**BACKFLUSHING SYSTEM RAPIDLY CLEANS FLUID FILTERS**

V. A. DesCamp (Martin Marietta Corp.), M. W. Boex (Martin Marietta Corp.), M. W. Hussey (Martin Marietta Corp.), and T. P. Larson (Martin Marietta Corp.)

Nov. 1973 See also NASA-CR-115505

**JSC-14273**

Self contained unit can backflush filter elements in fraction of the time expended by presently used equipment. This innovation may be of interest to manufacturers of hydraulic and pneumatic systems as well as to chemical, food, processing, and filter manufacturing industries.

**B73-10414**  
**SMOKE GENERATOR**

K. L. Parrish  
 Dec. 1973

**LANGLEY-11433**

Generator is simple in construction, efficient, and extremely easy to start and regulate. It can be of such small size and weight that it can be installed easily inside a model. Size can be changed to suit needs, as long as operating temperatures can be attained and identified controls are utilized.

**B73-10419**  
**ACCELEROMETER-CONTROLLED AUTOMATIC BRAKING**

**SYSTEM**

R. C. Dreher, R. K. Sleeper, and J. R. Nayadley, Sr.  
Dec. 1973 See also NASA-TN-D-6953

**LANGLEY-11383**

Braking system, which employs angular accelerometer to control wheel braking and results in low level of tire slip, has been developed and tested. Tests indicate that system is feasible for operations on surfaces of different slipperinesses. System restricts tire slip and is capable of adapting to rapidly-changing surface conditions.

**B73-10429****CONDENSATE-REMOVAL DEVICE FOR HEAT EXCHANGERS**

R. B. Trusch (United Aircraft Corp.) and E. W. O'Connor (United Aircraft Corp.)

Dec. 1973

**JSC-14143**

Device comprises array of perforated tubes manifolded together and connected to a vacuum suction device. Vacuum applied to these tubes pulls mixture of condensate and effluent gas through perforations and along length of tubes to discharge device. Discharge device may be a separator which separates water vapor from effluent air and allows recirculation of both of them.

**B73-10430****SEQUENTIAL-STRIP AND SEQUENTIAL-DISK FILTERS**

J. P. Winzen (Brunswick Corp.)

Dec. 1973

**JSC-14592**

Filter senses increasing pressure drop and uses this to compress bellows. Compression of bellows stores energy in spring until predetermined pressure-drop level is reached. At this point, bellows and spring are released. Relaxation of spring is used to move a clean area of screen into position across fluid stream.

**B73-10455****INSTRUMENT FOR MEASURING THIN-FILM BELT LENGTHS**

T. A. Casad, H. Piggott, and J. K. Hoffman

Mar. 1974

**NPO-13149**

Instrument consists of base, vernier height gauge, sliding block, and balance-beam assembly with tension weight. Pulley bracket is provided with three pulley mounting holes, 4 inches apart, to accommodate widely different belt lengths. Instrument is accurate to within 0.001 inch and is suitable for commercial production.

**B73-10456****LINEAR KINEMATIC AIR BEARING**

S. D. Mayall

Mar. 1974

**NPO-13151**

Bearing provides continuous, smooth movement of the cat's-eye mirror, eliminating wear and deterioration of bearing surface and resulting oscillation effects in servo system. Design features self-aligning configuration; single-point, pivotal pad mounting, having air passage through it; and design of pads that allows for precise control of discharge path of air from pads.

**B73-10464****NONDESTRUCTIVE LEAK TESTING**

T. K. Lusby, Jr. and F. Lawrence

Mar. 1974

**LANGLEY-11561**

Method provides opportunity to effect repairs without compromising integrity of enclosed circuitry or mechanism by loss of atmosphere or by ingestion of foreign matter or gas. It is possible to detect leaks in modules which are sealed while fully evacuated, partially evacuated, or containing some form of gas.

**B73-10465****STRAIN ARRESTOR PLATE FOR MOUNTING RIGID INSULATING TILES**

M. H. Kural (Lockheed Missiles & Space Co.)

Mar. 1974

**JSC-14182**

Plate is made of material having coefficient to thermal expansion similar to that of insulating material. Although plate may be formed from appropriate alloy, it has been found that a combination of graphite fibers in epoxy resin is satisfactory and much lighter in weight.

**B73-10466****SOLID-STATE CONTROLLER**

C. L. Bailey

Mar. 1974

**JSC-12394**

Attitude controllers are used to guide roll, pitch, and yaw of vehicle in flight. Controllers enclose multitude of switches, gears, cams, and other hardware needed to transmit pilot's commands to attitude control systems. New design, using magnetic coupled transducers, eliminates many mechanical parts, improving reliability and reducing maintenance.

**B73-10470****IMPROVED METHOD FOR AERODYNAMIC ANALYSIS OF WING-BODY-TAIL CONFIGURATIONS IN SUBSONIC AND SUPERSONIC FLOW**

C. H. Jr. Fox and F. A. Woodward (Analytical Methods, Inc.)

Mar. 1974

**LANGLEY-11305**

Method permits analysis of noncircular bodies and calculation of wing-body interference effects in presence of body closure, two features not previously available. In addition, use of vortex distribution, having linear variation in streamwise direction, results in improved chordwise pressure distributions on wing and tail surfaces.

**B73-10478****IMPROVED SYNCOM-TYPE FLUID DAMPER**

J. Evans

Mar. 1974

**GSFC-11205**

Two efficient types of fluid nutation dampers that are simple, reliable, and inexpensive have been developed. In use, either damper may be mounted on a spinning body, parallel to the spin axis of the body and radially displaced from it, to eliminate nutation.

**B73-10484****SOLAR-ENERGY ABSORBER: ACTIVE INFRARED (IR) TRAP**

L. W. Brantley, Jr.

Mar. 1974

**M-FS-22743**

Efficiency of solar-energy absorbers may be improved to 95% by actively cooling their intermediate glass plates. This approach may be of interest to manufacturers of solar absorbers and to engineers and scientists developing new sources of energy.

**B73-10485****SOLAR-ENERGY ABSORBER: ACTIVE INFRARED (IR) TRAP WITHOUT GLASS**

L. W. Brantley, Jr.

Mar. 1974

**M-FS-22744**

Absorber efficiency can be improved to 90% by removing glass plates and using infrared traps. Absorber configuration may be of interest to manufacturers of solar absorbers and to engineers and scientists developing new sources of energy.

**B73-10496****MASTER/SLAVE MANIPULATOR SYSTEM**

H. C. Vyukal, R. F. King, and W. C. Vallotton

Dec. 1973 See also B72-10297

**ARC-10756**

System capabilities are equivalent to mobility, dexterity, and strength of human arm. Arrangement of torque motor, harmonic drive, and potentiometer combination allows all power and control leads to pass through center of slave with position-transducer arrangement of master, and 'stovepipe joint' is incorporated for manipulator applications.

**B73-10497**  
**MECHANICAL PLANETARY COMPENSATING DRIVE SYSTEM**

R. J. Zeiger and J. C. Gerdtz, Jr.  
Dec. 1973

**ARC-10462**

Drive enables two concentric output shafts to be controlled independently or rotated as a unit. Possible uses are pointing and tracking devices, rotary camera shutters with variable light control, gimbal systems with yaw and pitch movement, spectrometer mirror scanning devices, etc.

**B73-10502**

**FLEX FLAP**

N. S. Currey (Lockheed-Georgia Co.) and J. T. Perry (Lockheed-Georgia Co.)

Dec. 1973

**ARC-10771**

To provide flap with large upper surface radius as required for airplanes with over-the-wing blowing, distort upper surface of flap by actuator. Flap can be used as control surface at leading as well as trailing edges and, with minor modification, as variant of Jacobs-Hurkamp air flap.

**B73-10518**

**NONCONTACTING DEVICES TO INDICATE DEFLECTION AND VIBRATION OF TURBOPUMP INTERNAL ROTATING PARTS**

D. B. Hamilton (Battelle Mem. Inst.), D. Ensminger (Battelle Mem. Inst.), D. R. Grieser (Battelle Mem. Inst.), A. M. Plummer (Battelle Mem. Inst.), E. J. Saccocio (Battelle Mem. Inst.), and J. W. Kissel (Battelle Mem. Inst.)

Mar. 1974

**M-FS-22678**

Published report discusses feasibility of ultrasonic techniques; neutron techniques; X-radiography; optical devices; gamma ray devices; and conventional displacement sensors. Use of signal transmitters in place of slip rings indicated possible improvement and will be subject of further study.

**B73-10524**

**SOLAR-ENERGY CONVERSION SYSTEM PROVIDES ELECTRICAL POWER AND THERMAL CONTROL FOR LIFE-SUPPORT SYSTEMS**

B. K. Davis

Mar. 1974

**M-FS-21628**

System utilizes Freon cycle and includes boiler turbogenerator with heat exchanger, regenerator and thermal-control heat exchangers, low-pressure and boiler-feed pumps, and condenser. Exchanger may be of interest to engineers and scientists investigating new energy sources.

## 07 MACHINERY, EQUIPMENT AND TOOLS

**B73-10001**

**A FLEXIBLE CRUCIFORM JOURNAL BEARING MOUNT**

A. E. Frost (Mechanical Technol., Inc.) and W. A. Geiger, (Mechanical Technol., Inc.)

Nov. 1973 See also NASA-CR-121098

**LEWIS-11035**

Flexible mount achieves low roll, pitch and yaw stiffnesses while maintaining high radial stiffness by holding bearing pad in fixed relationship to deep web cruciform member and holding this member in fixed relationship to bearing support. This mount has particular application in small, high performance gas turbines.

**B73-10008**

**CARBIDE FACTOR PREDICTS ROLLING-ELEMENT BEARING FATIGUE LIFE**

J. L. Chevalier (Army Air Mobility R & D Lab.) and E. V. Zaretsky  
Mar. 1973 See also NASA-TN-D-6835

**LEWIS-11940**

Analysis was made to determine correlation between number and size of carbide particles and rolling-element fatigue. Correlation was established, and carbide factor was derived that can be used to predict fatigue life more effectively than such variables as heat treatment, chemical composition, and hardening mechanism.

**B73-10047**

**FATIGUE TESTING DEVICE**

F. E. Eichenbrenner and L. A. Imig

Feb. 1973

**LANGLEY-10426**

Anti-buckling assembly prevents buckling of sheet metal fatigue specimen when axial compressive load is applied. It provides for cyclic heating and cooling of specimen during testing. Assembly permits tests at two locations on specimen. Device has ports for visual, optical, or photographic monitoring of fatigue crack propagation in test specimen.

**B73-10070**

**REDUNDANT SCREWJACK**

R. W. Benjamin (Rockwell Intern. Corp.)

Aug. 1973

**JSC-19200**

Device uses differential gears to drive either one of two nut-screw assemblies. In event that one assembly jams, second assembly is driven at twice its normal rate with no loss in overall performance.

**B73-10098**

**BEAM LEAD FORMING TOOL**

P. W. Clemons (Sperry Rand Corp.)

Feb. 1973

**M-FS-22133**

Tool was designed for table-top manual operation that can bend leads to any desired angle up to 90 degrees. It can be readily adapted to electrical, hydraulic, or pneumatic operation. This innovation may be of interest to electronics, sheet metal, and appliance industries.

**B73-10110**

**GEYSERING INHIBITOR PIPE**

F. S. Howard

Jun. 1973

**KSC-10615**

Smaller concentric pipe is welded to main pipe beginning above bottom of isolation valve and terminating in storage tank at top. There is continuous circulation of fluid which maintains fluid temperature below boiling temperature of liquid oxygen.

**B73-10124**

**MAGNETOCALORIC PUMP**

G. V. Brown

Aug. 1973 See also NASA-TM-X-52983

**LEWIS-11672**

Very cold liquids and gases such as helium, neon, and nitrogen can be pumped by using magnetocaloric effect. Adiabatic magnetization and demagnetization are used to alternately heat and cool slug of pumped fluid contained in closed chamber.

**B73-10125**

**ELECTROMAGNETIC CONNECTOR**

W. C. Gardner (Rockwell Intern. Corp.)

Mar. 1973

## 07 MACHINERY, EQUIPMENT AND TOOLS

### JSC-17420

Connector pair consists of two iron cores brought together a short distance from each other. Each core is wound with insulated wire. Ac signal is connected through the pair across the gap by magnetic induction. Device can be used underwater or in flammable atmosphere.

### B73-10190

#### FLOATING BAFFLE TO IMPROVE EFFICIENCY OF LIQUID TRANSFER FROM TANKS

F. S. Howard  
Jun. 1973  
KSC-10639

When liquid tank is full, baffle is held up against a stop on top of shaft to prevent restriction of flow from outlet. As tank is being emptied, baffle, floating on top of liquid surface, descends with liquid level toward outlet until it reaches its bottom stop. Baffle prevents gas pull-through until practically all liquid is emptied from tank.

### B73-10193

#### MULTIHEAD MEASURING TAPE

D. L. Posey  
Jun. 1973

### LANGLEY-11266

By using multihead measuring tape, procedure to obtain length and angle measurement on either wood or metal stock is reduced to one step. Length and angle of measurement can be locked in on measuring device for repetitive measurements. Measuring tape can be used for layout work or to duplicate length and angle of existing stock.

### B73-10203

#### LEAK DETECTOR-MEASURER

J. T. Sawyer  
Jun. 1973  
M-FS-21761

Detector locates leaks from inside pressurized cabins. Head is placed flush against area being tested. Should leak be present, most air inside detector housing will escape. Diaphragm will then flex into chamber and push electrical contact together, closing circuit and turning on warning light.

### B73-10204

#### ADVANCED ACTION MANIPULATOR SYSTEM (ADAMS)

D. A. Kugath (GE), D. H. Dane, and H. T. Blaise  
Jun. 1973

### M-FS-22022

Manipulator offers improved performance over other models in its category. It features larger force and reach capabilities and is readily convertible for underwater use. Unique kinematic arrangement provides extremely large working envelope. System has six degrees of motion: azimuth joint, shoulder joint, upper arm rotating joint, elbow joint, wrist pitch, and wrist twist.

### B73-10216

#### A PROPOSED HAND-TOOL ASSEMBLY FOR ROBOTS

D. H. Dane and H. T. Blaise  
Aug. 1973 See also B73-10204  
M-FS-22266

Terminator Kit Assembly (TKA) includes all features that mechanical manipulator needs to use hand tools for maintenance, repair, or assembly work. Tool box holds hand tools and, on command, releases them to hand interface which accepts and operates them. TKA is being studied as possible prosthetic device.

### B73-10250

#### SELF-ADJUSTING ASSEMBLY JIG

M. J. Haaser  
Dec. 1973

### LEWIS-12034

Jig adjusts for thermal expansion and contraction to hold parts being joined under constant pressure and in correct alignment during entire joining operation. Jig is simple and easy to use, durable and maintenance free. Several methods may be used to join parts of many sizes and shapes.

### B73-10324

#### UNIVERSAL DRILL JIG

E. J. Stringer (Rockwell Intern. Corp.)  
Oct. 1973

### M-FS-24464

Inexpensive jig can steadily guide drill at selected angles to flat plane from any direction. Jig uses two mutually perpendicular bevel bodies, each corresponding to interval settings. Drill block has spline on one side to engage groove on bevel body at selected angle. Angles are set by loosening wing nuts, tilting, drill block to desired angle until spline engages groove, and tightening nuts.

### B73-10329

#### SMALL PORTABLE SPEED CALCULATOR

J. L. Burch and J. C. Billions  
Oct. 1973

### M-FS-22638

Calculator is adapted stopwatch calibrated for fast accurate measurement of speeds. Single assembled unit is rugged, self-contained, and relatively inexpensive to manufacture. Potential market includes automobile-speed enforcement, railroads, and field-test facilities.

### B73-10335

#### VARIABLE LOAD INDICATOR

W. T. Appleberry (McDonnell Douglas Corp.)  
Oct. 1973

### M-FS-21728

Weighing device measures loads as a function of its elongation. Device is compact, simple, and inexpensive. It does not require presetting and will measure any load from zero to its yield point. Because of its low cost relative to other load indicators such as strain gauges, device can be used as turnbuckle for tensioning straps, rods, or cables where accurate preloading is critical.

### B73-10369

#### EMERGENCY-ESCAPE DEVICE

P. M. Broussard  
Oct. 1973

### M-FS-22720

Relatively simple inexpensive device uses reeled steel cable, is controlled by automotive-type shock absorber, and allows safe descent from burning building. Device is cheap to manufacture and assemble and requires neither skill, special knowledge, or athletic ability to operate. It is reliable and fireproof and can be deployed instantly.

### B73-10412

#### DESIGN HANDBOOK FOR GASEOUS FUEL ENGINE INJECTORS AND COMBUSTION CHAMBERS

D. F. Calhoun (Aerojet Liquid Rocket Co.), I. Ito (Aerojet Liquid Rocket Co.), and D. L. Kors (Aerojet Liquid Rocket Co.)  
Dec. 1973 See also NASA-CR-121234

### LEWIS-12154

Results of investigation of injection, mixing, and combustion processes using gaseous fuels and oxidizers have been summarized in handbook presenting succinct design procedures for injectors and methods for estimating combustion efficiency, chamber heat flux and stability characteristics. Handbook presents two approaches to injector and combustion chamber design: empirical and analytical.

### B73-10413

#### COLLAPSIBLE PISTONS FOR LIGHT-GAS GUNS

R. N. Teng (McDonnell Douglas Corp.)  
Dec. 1973

### JSC-13789

Moving and expandable parts of gun consist of pump-tube diaphragm, piston, launch-tube diaphragm, and sabot projectile. As a result of improved piston design, pressure cycle has been significantly improved by smoother buildup, increasing muzzle velocities up to 50%.

**B73-10415****POPPET VALVE TESTER**

G. F. Tallier (Rockwell Intern. Corp.)  
Dec. 1973 See also NASA-CR-120976  
**LEWIS-11655**

Tester investigates fundamental factors affecting cyclic life and sealing performance of valve seats and poppets. Tester provides for varying impact loading of poppet against seat and rate of cycling, and controls amount and type of relative motion between sealing faces of seat and poppet. Relative motion between seat and poppet can be varied in three modes.

**B73-10416****CONTAINER SEAL FOR DUSTY ENVIRONMENT**

R. S. Nevin, Sr. (Martin Marietta Corp.)  
Dec. 1973  
**LANGLEY-10962**

Method maintains cleanliness of joint-sealing surfaces under dust-laden conditions. This is accomplished by keeping seal and sealing surface covered with sliding plastic rings, which slide out of the way when a joint is seated.

**B73-10433****TOOL FOR INSTALLING OR EXTRACTING SMALL BULBS IN LIMITED-ACCESS SPACES**

E. B. Snyder and J. H. Parker  
Dec. 1973  
**Langley-11543**

Installing and extracting component of tool is plastic tubing with inside diameter which provides snug fit over bulb. Other components, which provide sturdiness and ease of operation, consist of metal tube, with collar near one end, and plunger, with knob on one end and Teflon tip on the other.

**B73-10450****FAIL-SAFE BIDIRECTIONAL VALVE DRIVER**

H. Fujimoto  
Feb. 1974  
**NPO-11958**

Cross-coupled diodes are added to commonly used bidirectional valve driver circuit to protect circuit and power supply. Circuit may be used in systems requiring fail-safe bidirectional valve operation, particularly in chemical- and petroleum-processing control systems and computer-controlled hydraulic or pneumatic systems.

**B73-10461****INJECTOR HAS NO BACKSPASH**

W. B. Powell  
Jan. 1974  
**NPO-13208**

Passages of injector have been modified to eliminate backspashing. All fluid is expelled in downstream spray fan. Result is that face of injector is completely free of liquid obstructions.

**B73-10463****FERROFLUID SEPARATOR FOR NONFERROUS SCRAP SEPARATION**

R. Kaiser (Avco Corp.) and L. Mir (Avco Corp.)  
Mar. 1974  
**LANGLEY-11523**

Behavior of nonmagnetic objects within separator is essentially function of density, and independent of size or shape of objects. Results show close agreement between density of object and apparent density of ferrofluid required to float it. Results also demonstrate that very high separation rates are achievable by ferrofluid sink-float separation.

**B73-10472****A METHANOL/AIR FUEL CELL SYSTEM**

W. J. Asher (Exxon Corp.)  
Mar. 1974 See also B73-10472; B73-10473; B73-10475;  
B73-10489  
**M-FS-22541**

High power-density, self-regulating fuel cell develops

electrical power from catalyzed reaction between methanol and atmospheric oxygen. Cells such as these are of particular interest, because they may one day offer an emission-free, extremely efficient alternative to internal-combustion engines as power source.

**B73-10473****AN ELECTROCHEMICAL ENGINE**

W. J. Asher (Exxon Corp.)  
Mar. 1974 See also B73-10472; B73-10475; B73-10489  
**M-FS-22542**

Thin-electrode fuel cell, with electrodes arranged in circular shape, can provide power for new electrochemical engine. With this system, a safe high-voltage engine may be constructed. Since each electrode assumes a potential relative to electrolyte, and since there are no electrolyte paths between cells, any number of cell stacks can be connected in series.

**B73-10489****FUEL-CELL HEAT AND MASS PLATE**

W. J. Asher (Exxon Corp.)  
Mar. 1974 See also B73-10472; B73-10473; B73-10475  
**M-FS-21318; M-FS-21319**

Plate, serving as heat pipe, can be built into cell to control temperature and water inventory. Plate consists of matrix, filled with liquid water, and a space, filled with water vapor. Both matrix and space extend beyond fuel-cell stack so heat and water may be removed as necessary.

**B73-10521****APPARATUS FOR CUTTING ELASTOMERIC MATERIALS**

A. B. Corbett  
Mar. 1974  
**NPO-13146**

Sharp thin cutting edge is held in head of milling machine designed for metal working. Controls of machine are used to position cutting edge in same plane as vibrating specimen. Controls then are operated, making blade come into contact with specimen, to cut it into shapes and sizes desired. Cut surfaces appear mirror-smooth; vibrating mechanism causes no visible striations.

## 08 FABRICATION TECHNOLOGY

**B73-10003****PRODUCTION OF SMALL DIAMETER HIGH-TEMPERATURE-STRENGTH REFRACTORY METAL WIRES**

D. W. Petrasek, R. A. Signorelli, and G. W. King (Westinghouse Elec. Corp.)  
Mar. 1973 See also NASA-CR-120925; NASA-TN-D-6881  
**LEWIS-11802**

Special thermomechanical techniques (schedules) have been developed to produce small diameter wire from three refractory metal alloys: colombian base alloy, tantalum base alloy, and tungsten base alloy. High strengths of these wires indicate their potential for contributing increased strength to metallic composites.

**B73-10005****IMPROVED DIFFUSION WELDING AND ROLL WELDING OF TITANIUM ALLOYS**

K. H. Holko  
Mar. 1973 See also B71-10455; NASA-TN-D-6409; NASA-TN-D-6958  
**LEWIS-11852**

Auto-vacuum cleaning technique was applied to titanium parts prior to welding. This provides oxide-free welding surfaces. Diffusion welding can be accomplished in as little as five minutes of hot pressing. Roll welding can be accomplished with only 10% deformation.

**B73-10013**  
**REFRACTORY INSERTS USED TO FORM COOLING**  
**PASSAGES IN CAST SUPERALLOY TURBINE VANES**

A. Terpay  
 Mar. 1973  
**LEWIS-11169**

Economical technique has been developed for manufacturing air-cooled turbine blades and vanes for gas turbine engines. Process uses tungsten inserts to form coolant passages. After casting, inserts are reduced to tungsten oxide during sublimation with oxygen at elevated temperature. Tungsten oxide is leached out of coolant passages with a molten salt solution.

**B73-10032**  
**METHOD FOR CASTING POLYETHYLENE PIPE**

R. M. Elam, Jr.  
 Feb. 1973  
**ARC-10706**

Short lengths of 7-cm ID polyethylene pipe are cast in a mold which has a core made of room-temperature-vulcanizable (RTV) silicone. Core expands during casting and shrinks on cooling to allow for contraction of the polyethylene.

**B73-10038**  
**LARGE BORON-EPOXY FILAMENT-WOUND PRESSURE**  
**VESSELS**

W. M. Jensen, R. L. Bailey, and A. C. Knoell  
 Feb. 1973  
**NPO-11900**

Advanced composite material used to fabricate pressure vessel is prepeg (partially cured) consisting of continuous, parallel boron filaments in epoxy resin matrix arranged to form tape. To fabricate chamber, tape is wound on form which must be removable after composite has been cured. Configuration of boron-epoxy composite pressure vessel was determined by computer program.

**B73-10040**  
**DENSIFICATION OF POWDER METALLURGY BILLETS BY**  
**A ROLL CONSOLIDATION TECHNIQUE**

W. H. Sellman (Fansteel, Inc.) and W. R. Weinberger (Fansteel, Inc.)  
 Mar. 1973 See also NASA-CR-120796  
**LEWIS-11395**

Container design is used to convert partially densified powder metallurgy compacts into fully densified slabs in one processing step. Technique improves product yield, lowers costs and yields great flexibility in process scale-up. Technique is applicable to all types of fabricable metallic materials that are produced from powder metallurgy process.

**B73-10072**  
**DIFFUSION WELDING TOOL**

T. B. Milam (Pratt & Whitney Aircraft Corp.)  
 Feb. 1973  
**LEWIS-11807**

Tool allows flat plate diffusion welding to be done in standard brazing furnace. Weld is achieved using high water pressure applied by hand-operated positive-displacement pump. Good welds have been obtained between nickel and nickel-base alloy plates at temperature of 1200 K and water pressure of 13.8 million N/sq m.

**B73-10082**  
**FILAMENT WINDING TECHNIQUE PRODUCES STRONG**  
**LIGHTWEIGHT OXYGEN TANKS**

J. F. Shuessler (McDonnell Douglas Corp.) and R. J. Dannenmuel-ler (McDonnell Douglas Corp.)  
 May 1973  
**M-FS-22470**

Fiberglass is wound in three winding and cure sequences with first two followed by grit blasting of surface before final step. Result is uniformly stressed metal liner assembly with excellent structural characteristics.

**B73-10258**  
**IMPROVED FIBERGLASS-TO-METAL JOINT PRODUCES**  
**LIGHTER STRONGER FIBERGLASS STRUT**

J. R. Barber, H. E. Johnson (Lockheed Missiles & Space Co.), and K. T. Eugene (Lockheed Missiles & Space Co.)  
 Aug. 1973 See also NASA-CR-72538  
**LEWIS-11661**

Axial tension and compression are transmitted between end fittings and fiberglass tube without depending on glass-to-metal bonding, conventional fasteners or combination of these things. Joint design significantly reduces both structural weight of strut and its cross-sectional area.

**B73-10265**  
**BORON-EPOXY TUBULAR STRUCTURE MEMBERS**

W. B. J. Shakespeare (TRW Systems Group), P. T. Nelson (TRW Systems Group), and E. C. Lindkvist (TRW Systems Group)  
 Jun. 1973  
**ARC-10737**

Composite materials fabricate thin-walled tubular members which have same load-carrying capabilities as aluminum, titanium, or other metals, but are lighter. Interface between stepped end fitting and tube lends itself to attachments by primary as well as secondary bonding. Interlaminar shear and hoop stress buildup in attachment at end fitting is avoided.

**B73-10284**  
**EUTECTIC BONDING OF SAPPHIRE TO SAPPHIRE**

J. J. Deluca  
 Aug. 1973  
**GSFC-11577**

Eutectic mixture of aluminum oxide and zirconium oxide provides new bonding technique for sapphires and rubies. Technique effectively reduces possibility of contamination. Bonding material is aluminum oxide and zirconium oxide mixture that matches coefficient of thermal expansion of sapphire.

**B73-10287**  
**SHUTTLE ORBITER STORAGE LOCKER SYSTEM: A STUDY**

D. R. Butler (Raymond Loewy/William Snaith, Inc.), D. T. Schowalter (Raymond Loewy/William Snaith, Inc.), and D. C. Weil (Raymond Loewy/William Snaith, Inc.)  
 Sep. 1973 See also NASA-CR-128864  
**JSC-14448**

Study has been made to assure maximum utility of storage space and crew member facilities in planned space shuttle orbiter. Techniques discussed in this study should be of interest to designers of storage facilities in which space is at premium and vibration is severe. Manufacturers of boats, campers, house trailers, and aircraft could benefit from it.

**B73-10298**  
**EMBOSSSED METAL DIAPHRAGM HAS TWO-WAY**  
**STRETCH**

W. F. MacGlashan, Jr.  
 Jul. 1973  
**NPO-11635**

Diaphragm with embossed pattern has greater structural rigidity than one with smooth surfaces, but under severe stress, tensile loads will flatten embossing. This provides necessary additional panel stretch needed to prevent rupture of diaphragm material. Hexagonal embossing-configuration allows panel stretch in any direction or in all directions simultaneously.

**B73-10311**  
**DESIGN GUIDE FOR GLASS FIBER REINFORCED METAL**  
**PRESSURE VESSEL**

R. E. Landes (Structural Composites Ind.)  
 Dec. 1973 See also NASA-CR-120917; NASA-CR-120918  
**LEWIS-12042**

Design Guide has been prepared for pressure vessel engineers concerned with specific glass fiber reinforced metal tank design or general tank tradeoff study. Design philosophy, general equations, and curves are provided for safelife design of tanks operating under anticipated space shuttle service conditions.

**B73-10340****RADIAL HONEYCOMB CORE**

R. B. Cantley (Lockheed-Georgia Co.), C. C. Nelson, Jr. (Lockheed-Georgia Co.), R. W. Patterson (Lockheed-Georgia Co.), and K. H. Potter (Lockheed-Georgia Co.)  
Aug. 1973

**ARC-10727**

Core alleviates many limitations of conventional nacelle construction methods. Radical core, made of metals or nonmetals, is fabricated either by joining nodes and then expanding, or by performing each layer and then joining nodes. Core may also be produced from ribbons or strips with joined nodes or ribbons oriented in longitudinal planes.

**B73-10358****NEW CONCEPT IN BRAZING METALLIC HONEYCOMB PANELS**

P. D. Carter (Boeing Co.), R. E. Layton (Boeing Co.), and F. W. Stratton (Boeing Co.)  
Oct. 1973

**LANGLEY-10957**

Aluminum oxide coating provides surface which will not be wetted by brazing alloy and which stops metallic diffusion welding of tooling materials to part being produced. This method eliminates loss of tooling materials and parts from braze wetting and allows fall-apart disassembly of tooling after brazing.

**B73-10375****MANUFACTURE OF LARGE, LIGHTWEIGHT PARABOLIC ANTENNAS**

S. W. Hooper (TRW, Inc.)  
Sep. 1973

**ARC-10741**

Antenna was produced in segments. Parabole sections were built up as aluminum foil sandwich with core bonded by film adhesive; whole structure was oven-cured after assembly. Structure was assembled with special tool for splice-bonding segments into complete dish, and inflatable bladder to apply pressure at joints during cure.

**B73-10391****FLAT-BAND ASSEMBLY FOR TOROIDAL TRANSFORMER CORES**

W. T. McLyman  
Sep. 1973

**NPO-11966**

Toroidal transformer cores are often banded together by means of strap. Spot welds secure strap. Proper tension is obtained by use of special fixture in conjunction with winding of wire which is placed temporarily on core; winding is excited by dc current to hold core halves together magnetically during alignment.

**B73-10438****PROCEDURE FOR DISPERSING FIBER BUNDLES**

D. Padilla (Martin Marietta Corp.)  
Feb. 1974

**LANGLEY-11224**

Fiber bundles are dispersed and fibers are cleaned within enclosed container; therefore, safety clothing, masks, and eye protection are not required. Procedure also could be used wherever materials, such as fiberglass or insulation, require dispersion, fluffing, or cleaning. Process could be automated into continuous operation for handling large quantities of fiber.

**B73-10439****ADHESIVE COATING ELIMINATED IN NEW HONEYCOMB-CORE FABRICATION PROCESS**

W. L. Batty (Martin Marietta Corp.), R. H. Hayes (Martin Marietta Corp.), and F. S. Magee (Martin Marietta Corp.)  
Jan. 1974

**LANGLEY-11134**

Technique eliminates use of silicone-based adhesive material as bonding medium. Adhesive requires precise time-temperature cure. Prepreg resin is used as bonding medium, and each layer is laminated together to form honeycomb billet. Process can be

used in any application where nonmetallic honeycomb core is being fabricated.

**B73-10508****GRAIN REFINEMENT CONTROL IN GAS-SHIELDED ARC WELDING OF ALUMINUM TUBING**

W. F. Iceland (Rockwell Intern. Corp.) and E. L. Whiffen (Rockwell Intern. Corp.)  
Mar. 1974

**JSC-19095**

When sections are being welded, operator varies pulse rate of power supply and simultaneously monitors signal on oscilloscope until rate is found which produces maximum arc gas voltage. Remainder of welding is performed with power supply set at this pulse rate, producing desired maximum weld puddle agitation and fine uniform weld of grain structure.

**B73-10528****X-RAY OPAQUE ADDITIVE FOR INSPECTION OF WELD JOINTS**

R. L. Brown and J. L. Cook (McDonnell Douglas Corp.)  
Mar. 1974

**M-FS-22896**

Thin coating of copper applied to each faying surface of aluminum-alloy improve X ray detection of welding defects. Copper may be applied by spraying, coating, or deposition. Thickness of faying surfaces must be uniform in range. Coating must be free from spalling and blistering and must contain no porosity.

**09 COMPUTER PROGRAMS****B73-10012****N-BODY U AND K MATRIX PROGRAM**

R. N. Setter (Gen. Dynamics Corp.), L. Ojeda (Gen. Dynamics Corp.) and R. F. Hoelt (Gen. Dynamics Corp.)  
Mar. 1973

**LEWIS-11438**

Computer program was devised to compute free-fall trajectories of satellites, allowing for injection errors and midcourse velocity perturbations. Program consists of trajectory perturbing program and N-body integrating conic program which can also be used as 2-body patch conic program.

**B73-10049****A COMPREHENSIVE PROGRAM FOR TEXTUAL CONCORDANCES AND STATISTICS**

L. A. Ule (Rockwell Intern. Corp.)  
Mar. 1973

**JSC-17484**

Literary research tool can provide concordance and many other textual statistics relating to authorship or sequence of composition. Mechanical text manipulation provides wide variety of text formats and conventions (such as upper case). This program is written in FORTRAN H for use on IBM-360 computer.

**B73-10053****AUTOMATED DATA MANAGEMENT INFORMATION SYSTEM**

C. Blackstone, D. Dunn, E. Sullivan, J. Whitlock (GE), D. Buehler (GE), L. Pratt, T. Hoffditz (Federal Elec. Corp.), J. Rose (Federal Elec. Corp.), M. Smithson (Federal Elec. Corp.), and J. Feeley (Federal Elec. Corp.)

**Mar. 1974****KSC-10819**

ADMIS stores and controls data and documents associated with manned space flight effort. System contains all data oriented toward a specific document; it is primary source of reports generated by the system. Each group of records is composed of one document record, one distribution record for each recipient of the document, and one summary record.

## 09 COMPUTER PROGRAMS

**B73-10064**

### **COMPUTER PROGRAM FOR TRANSIENT RESPONSE OF STRUCTURAL RINGS SUBJECTED TO FRAGMENT IMPACT**

R. W. -H. Wu (MIT) and E. A. Witmer (MIT)

May 1973

**LEWIS-11926**

Mathematical optimization of containment/deflection system would save time, effort, and material as well as afford designer greater opportunity to investigate new ideas and variety of materials.

**B73-10065**

### **AEROTHERM CHARRING MATERIALS ABLATION COMPUTER PROGRAM**

C. A. Powars (Acurax Corp.) and R. M. Kendal (Acurax Corp.)

May 1973

**LEWIS-11854**

Ablating-surface boundary conditions involve considerations of surface thermochemistry. Several programs may be used to provide surface thermochemistry information.

**B73-10066**

### **COMPUTER PROGRAM FOR PRELIMINARY DESIGN ANALYSIS OF AXIAL-FLOW TURBINES**

A. J. Glassman

Feb. 1973

**LEWIS-11815**

Computations are based on mean-diameter flow properties. For any given turbine, all stages, except the first, are specified to have same shape velocity diagram. First stage inlet flow is axial.

**B73-10067**

### **A METHOD FOR ECONOMIC EVALUATION OF REDUNDANCY LEVELS FOR AEROSPACE SYSTEMS**

P. W. Hodge (Grumman Aerospace Corp.) and B. Frumkin (Grumman Aerospace Corp.)

Feb. 1973 See also NASA-CR-128494

**KSC-10754**

Principle comprises primary cost impacts, such as operational delays, reflown missions due to aborts, procurement of equipment, and vehicle expansion to accommodate additional equipment. Economics are estimated by criterion which is relatively insensitive to impertinent cost factors.

**B73-10073**

### **MEDICAL INFORMATION MANAGEMENT SYSTEM (MIMS): AN AUTOMATED HOSPITAL INFORMATION SYSTEM**

S. Alterescu, R. A. Schwarz (Federal City Coll.), and L. S. Collins (Federal City Coll.)

Mar. 1973

**GSFC-11540**

Flexible system of computer programs allows manipulation and retrieval of data related to patient care. System is written in version of FORTRAN developed for CDC-6600 computer.

**B73-10083**

### **BINARY CONCATENATED CODING SYSTEM**

L. G. Monford, Jr.

Mar. 1973

**JSC-14082**

Coding, using 3-bit binary words, is applicable to any measurement having integer scale up to 100. System using 6-bit data words can be expanded to read from 1 to 10,000, and 9-bit data words can increase range to 1,000,000. Code may be "read" directly by observation after memorizing simple listing of 9's and 10's.

**B73-10087**

### **PPUAS--PHOTOPEAK UNFOLDING AND SELF-SHIELDING PROGRAM**

M. Taherzadeh

Mar. 1973

**NPO-13188**

Computer code was developed to determine radioactive

emission rates of nuclear fuels. Code is basically written for two different source geometries; however, unfolding routine can be executed for other source geometries.

**B73-10088**

### **A GENERAL PURPOSE MANEUVER TURNS COMPUTER PROGRAM**

G. I. Jaivin

Mar. 1973

**NPO-13213**

Program computes turns required to point given spacecraft-fixed vector in direction of given inertially-fixed vector. Program was written in FORTRAN V language for Univac-1108 computer.

**B73-10091**

### **A LINEAR CIRCUIT ANALYSIS PROGRAM WITH STIFF SYSTEMS CAPABILITY**

C. H. Cook (Old Dominion Univ.) and S. J. Bavuso

Feb. 1973

**LANGLEY-11184**

Several existing network analysis programs have been modified and combined to employ a variable topological approach to circuit translation. Efficient numerical integration techniques are used for transient analysis.

**B73-10101**

### **A GENERALIZED APPROACH TO COMPUTER SYNTHESIS OF DIGITAL HOLOGRAMS**

W. A. Hopper (Sperry Rand Corp.)

Feb. 1973

**M-FS-21973**

Hologram is constructed by taking number of digitized sample points and blending them together to form "continuous" picture. New system selects better set of sample points resulting in improved hologram from same amount of information.

**B73-10104**

### **A SUMMARY REPORT ON SYSTEM EFFECTIVENESS AND OPTIMIZATION STUDY**

O. L. Williamson (Federal Elec. Corp.), A. J. Rydberg (Federal Elec. Corp.), and G. Dorris (Federal Elec. Corp.)

Mar. 1973

**M-FS-22126**

Report treats optimization and effectiveness separately. Report illustrates example of dynamic programming solution to system optimization. Computer algorithm has been developed to solve effectiveness problem and is included in report.

**B73-10114**

### **EIGENVALUE ROUTINE BY STURM SEQUENCE METHOD**

K. K. Gupta

Mar. 1973

**NPO-11805**

Computer program has been generated for efficient solution of certain broad classes of eigenvalue problems. Procedure fully exploits banded nature of associated matrices and further enables user to compute either all roots or any specific ones desired. Special storage options enable storing only nonzero elements of associated main matrix of eigenvalue problem.

**B73-10115**

### **AUTOMATED SHELL THEORY FOR ROTATING STRUCTURES (ASTROS)**

B. J. Foster (Teledyne Brown Engineering) and J. M. Thomas (Teledyne Brown Engineering)

Mar. 1973

**M-FS-21970**

Computer program can be used to analyze any disk or shell of revolution of arbitrary cross section under inertial loads caused by rotation about shell axis and under various static loads, including thermal gradients. Geometric shapes incorporated in program are ellipsoidal, spherical, ogival, toroidal, conical, circular plate, cylindrical, and parabolic.

**B73-10120**

### **ASCENT CONTROL ANALYSIS FOR S-II DERIVATIVE**

**LAUNCH VEHICLES, DIGITAL COMPUTER PROGRAM**

P. D. Andrews (Rockwell Intern. Corp.)  
 May 1973  
**M-FS-24324**

Model is used for analysis of the six degrees-of-freedom dynamics of general launch vehicle during atmospheric boost. Equations of motion are developed for rigid body and flat earth. Case may be started at any time beginning with ignition of stage and may be ended upon, or prior to, stage burnout. End of case may be at a specified time or based on propellant expended.

**B73-10162****GREMEX UPDATE (GODDARD RESEARCH ENGINEERING MANAGEMENT EXERCISE)**

M. J. Vaccaro and M. F. Denault  
 Jun. 1973

**GSFC-11512; GSFC-11515**

Management simulation techniques offer training in management problems. Exercise was developed to provide experience in research and development project decision making from management rather than technological perspective. Program and documentation have been revised innumerable times in past. Described report is revised version as it exists to date.

**B73-10165****THEORY AND CALCULUS OF CUBICAL COMPLEXES**

M. Perlman  
 Jun. 1973  
**NPO-11491**

Combination switching networks with multiple outputs may be represented by Boolean functions. Report has been prepared which describes derivation and use of extraction algorithm that may be adapted to simplification of such simultaneous Boolean functions.

**B73-10166****AN IMPROVED HOLOGRAPHIC RECORDING MEDIUM**

R. A. Gange (RCA)  
 Jun. 1973 See also B73-10155  
**M-FS-22532**

Solid, linear chain hydrocarbons with molecular weight ranging from about 300 to 2000 can serve as long-lived recording medium in optical memory system. Suitable recording hydrocarbons include microcrystalline waxes and low molecular weight polymers or ethylene.

**B73-10186****PRESSURE DROP AND PUMPING POWER FOR FLUID FLOW THROUGH ROUND TUBES**

D. Jelinek (Rockwell Intern. Corp.)  
 Jun. 1973  
**M-FS-24172**

Program, written for Hewlett-Packard 9100A electronic desk computer provides convenient and immediate solution to problem of calculating pressure drop and fluid pumping power for flow through round tubes. Program was designed specifically for steady-state analysis and assumes laminar flow.

**B73-10214****COMPUTER PROGRAM FOR THE DESIGN OF TOROIDAL TRANSFORMERS**

J. A. Dayton, Jr.  
 Nov. 1973

**LEWIS-11878**

Program relieves designer of most of the computational details, while he maintains control over most engineering decisions. Number of specifications that must be supplied by user allows for considerable flexibility and for exercise of engineering judgment. Speed of program makes it possible to run many cases, economically determining effect of various parameter changes.

**B73-10218****A FAULT-TOLERANT CLOCK**

W. P. Daley (MIT) and J. F. McKenna, Jr. (MIT)  
 Aug. 1973

**JSC-12531**

Computers must operate correctly even though one or more of components have failed. Electronic clock has been designed to be insensitive to occurrence of faults; it is substantial advance over any known clock.

**B73-10219****VALIDITY TEST FOR LINEAR ERROR ANALYSIS**

L. S. Diamant (TRW, Inc.)

Aug. 1973

**JSC-14378**

To determine whether estimation process simulated by linear error analysis will converge, criterion has been developed based on extension of classical observability. Particular application of technique is with groups of batched navigation data where statistics of estimation errors are derived with classical minimum-variance methods.

**B73-10227****SPECTRAL ANALYSIS PROGRAM (SAP)**

D. M. Detchmندی (TRW, Inc.) and W. L. Hayden (TRW, Inc.)

Aug. 1973

**JSC-14310**

Program eliminates or reduces time-consuming aspects of computation of power spectrum for high-frequency communication system. This program was written in FORTRAN IV for UNIVAC 1230 or 1108 computer.

**B73-10231****COMPUTER PROGRAM FOR CALCULATION OF THERMODYNAMIC AND TRANSPORT PROPERTIES OF COMPLEX CHEMICAL SYSTEMS**

R. A. Svehla and B. J. McBride

Nov. 1973

**LEWIS-11997**

Program performs calculations such as chemical equilibrium for assigned thermodynamic states, theoretical rocket performance for both equilibrium and frozen compositions during expansion, incident and reflected shock properties, and Chapman-Jouget detonation properties. Features include simplicity of input and storage of all thermodynamic and transport property data on master tape.

**B73-10232****A COMPUTER PROGRAM FOR CALCULATING DESIGN AND OFF-DESIGN PERFORMANCE FOR TURBOJET AND TURBOFAN ENGINES**

R. W. Koenig and L. H. Fishbach

Nov. 1973 See also B73-10245

**LEWIS-12010**

Program uses component performance maps to enable user to do analytical engine cycle calculations. Through scaling procedure, each of the component maps can be used to represent a family of maps. Either convergent or convergent-divergent nozzles may be used.

**B73-10233****COMPUTER PROGRAM TO DETERMINE THE IRRATIONAL NOZZLE ADMITTANCE**

W. A. Bell (Georgia Inst. of Tech.) and B. T. Zinn (Georgia Inst. of Tech.)

Nov. 1973

**LEWIS-12019**

Irrational nozzle admittance is the boundary condition that must be satisfied by combustor flow oscillations at nozzle entrance. Defined as the ratio of axial velocity perturbation to the pressure perturbation at nozzle entrance, nozzle admittance can also be used to determine whether wave motion in nozzle under consideration adds or removes energy from combustor oscillations.

**B73-10244****COMPUTER PROGRAM TO DETERMINE ROOTS OF POLYNOMIALS BY RATIO OF SUCCESSIVE DERIVATIVES**

J. E. Crouse and C. W. Putt

Nov. 1973

**LEWIS-11809**

## 08 COMPUTER PROGRAMS

High speed computing finds roots of polynomials with real number coefficients. Ratios of successive polynomial derivatives approach provides accurate roots-of-polynomial computer programs with very high reliability. With derivative ratio method, root analysis can still be done even though the polynomial and its lower order derivatives cannot be evaluated with sufficient accuracy.

**B73-10245**

### **A COMPUTER PROGRAM FOR CALCULATING DESIGN AND OFF-DESIGN PERFORMANCE OF TWO- AND THREE-SPOOL TURBOFANS WITH AS MANY AS THREE NOZZLES**

L. H. Fishbach and R. W. Koenig  
Nov. 1973 See also B73-10232

**LEWIS-12011**

Program uses component performance maps to enable user to do analytical engine cycle calculations. Either convergent or convergent-divergent nozzles may be used.

**B73-10246**

### **COMPUTER PROGRAM FOR COMPRESSIBLE FLOW NETWORK ANALYSIS**

M. E. Wilton (GE) and J. P. Murtaugh (GE)  
Dec. 1973

**LEWIS-11859**

Program solves problem of an arbitrarily connected one dimensional compressible flow network with pumping in the channels and momentum balancing at flow junctions. Program includes pressure drop calculations for impingement flow and flow through pin fin arrangements, as currently found in many air cooled turbine bucket and vane cooling configurations.

**B73-10247**

### **COMPUTER PROGRAM TO COMPUTE BUCKLING LOADS OF SIMPLY SUPPORTED ANISOTROPIC PLATES**

C. C. Chamis  
Dec. 1973

**LEWIS-11981**

Program handles several types of composites and several load conditions for each plate, both compressive or tensile membrane loads, and bending-stretching coupling via the concept of reduced bending rigidities. Vibration frequencies of homogeneous or layered anisotropic plates can be calculated by slightly modifying the program.

**B73-10248**

### **COMPUTER PROGRAM CALCULATES QUASI-ONE-DIMENSIONAL FLOW ACROSS FACE SEALS AND NARROW SLOTS**

J. Zuk and P. J. Smith  
Dec. 1973 See also B72-10114

**LEWIS-11996**

Program calculates mass and volume leakage across seal; mean friction factor; force; center of pressure; and distributions of pressure, temperature, density, friction parameter, velocity, and Mach number across seal for both laminar flow and turbulent flow regimes and for choked and subsonic flow.

**B73-10256**

### **A NEW ALGORITHM FOR FINDING SURVIVAL COEFFICIENTS EMPLOYED IN RELIABILITY EQUATIONS**

W. G. Bounicus (IBM) and B. J. Flehinger (IBM)  
Aug. 1973

**M-FS-22286**

Product reliabilities are predicted from past failure rates and reasonable estimate of future failure rates. Algorithm is used to calculate probability that product will function correctly. Algorithm sums the probabilities of each survival pattern and number of permutations for that pattern, over all possible ways in which product can survive.

**B73-10263**

### **COMPUTER PROGRAM FOR PREDICTING SYMMETRIC JET MIXING OF COMPRESSIBLE FLOW IN JETS**

G. B. Gilbert (Dynatech Corp.) and P. G. Hill (Queens Univ.)

Jun. 1973 See also NASA-CR-2251

**ARC-10730**

Finite-difference computer program has been developed for treating mixing of two parallel and compressible air streams; one of them may be supersonic. This development is restricted to symmetric jet mixing in which high-speed jet is located on axis of channel and no provision is made for blowing or suction along channel walls.

**B73-10266**

### **DIGITAL RANDOM-NUMBER GENERATOR**

D. H. Brocker  
Jul. 1973

**ARC-10096**

For binary digit array of N bits, use N noise sources to feed N nonlinear operators; each flip-flop in digit array is set by nonlinear operator to reflect whether amplitude of generator which feeds it is above or below mean value of generated noise. Fixed-point uniform distribution random number generation method can also be used to generate random numbers with other than uniform distribution.

**B73-10274**

### **MINIMUM SWITCHING NETWORK FOR GENERATING THE WEIGHT OF A BINARY VECTOR**

T. O. Anderson  
Jun. 1973

**NPO-11590**

Vector is divided into three variable sections, and each section is processed by unary-to-binary decoder or adder. Resulting network performs on iterative collection process; all outputs of same kind are collected in same manner. In combination with simple comparator gates, weighting network can also be used as majority network.

**B73-10296**

### **NODE-RECORDING METHOD FOR STIFFNESS MATRIX WAVEFRONT REDUCTION IN STRUCTURAL ANALYSIS**

R. Levy  
Jul. 1973

**NPO-11620**

Method provides approach to automatic node relabeling that is consistent with requirements of wavefront concept. Specific applications are in analysis of aircraft, building structures, radar and surveillance structures, bridges, etc., or any other structure that is studied with aid of large and complex analytical model. Minimum growth sequencing is effective, rapid, and capable of producing economies.

**B73-10300**

### **HYBRID COORDINATE FORMULATION USED FOR THE DESIGN OF ATTITUDE CONTROL SYSTEMS FOR FLEXIBLE SPACECRAFT**

P. W. Likins (UCLA) and E. E. Fleisher  
Jul. 1973

**NPO-11714**

Formulation combines certain advantages of discrete and distributed coordinates by using both simultaneously. In report summarizing method, theoretical development is extended as necessary for applications of practical interest. Explicit analyses are presented in sufficient detail to establish utility in flexible space vehicle control system of hybrid coordinate formulation.

**B73-10301**

### **STRUCTURAL ANALYSIS OF VISCOELASTIC MATERIALS UNDER THERMAL AND PRESSURE LOADING**

J. C. Chen  
Jul. 1973

**NPO-11727**

Technique computes stresses resulting from axisymmetric transient thermal loading in circular solid-propellant grain section with circular ports. Propellant is assumed to be linear, thermal rheologically simple, viscoelastic material; material properties are represented by exponential series in time.

**B73-10302**  
**ANALYSIS OF NONLINEAR VIBRATIONS OF CYLINDERS**  
 J. C. Chen  
 Jul. 1973 See also JPL-SPS-37-62-VOL-3; JPL-SPS-37-64-VOL-3

**NPO-11736**

In study of geometric nonlinear vibrations, infinite, long, thin-walled cylinder was analyzed under periodic, dynamic loading to demonstrate that some nonlinear phenomena cannot be obtained by straight-forward numerical solution methods. Results demonstrate that nonlinear phenomenon in large amplitude vibration traveling-wave condition can be predicted by analysis.

**B73-10303**  
**USE OF MULTIVARIABLE ASYMPTOTIC EXPANSIONS IN A SATELLITE THEORY**

S. S. Dallas  
 Jul. 1973

**NPO-11750**

Initial conditions and perturbative force of satellite are restricted to yield motion of equatorial satellite about oblate body. In this manner, exact analytic solution exists and can be used as standard of comparison in numerical accuracy comparisons. Detailed numerical accuracy studies of uniformly valid asymptotic expansions were made.

**B73-10307**  
**COMPUTER PROGRAM FOR THE PREDICTION OF REORIENTATION FLOW DYNAMICS**

W. S. Betts, Jr. (Gen. Dynamics Corp.)  
 Dec. 1973

**LEWIS-11816**

Program uses Navier-Stokes and continuity equations for incompressible, viscous fluid as the basic equations governing reorientation flow dynamics. Program can simulate curved as well as straight-walled boundaries; has ability to calculate both free-surface and confined flows; and can be used in either cylindrical or plane geometry.

**B73-10309**  
**PROGRAM FOR CALCULATING TOTAL-EFFICIENCY OF SPECIFIC-SPEED CHARACTERISTICS OF CENTRIFUGAL COMPRESSORS**

M. R. Galvas (Army Air Mobility R. & D. Lab.)  
 Dec. 1973

**LEWIS-12008**

Program uses one-dimensional mean streamline analysis conducted at fixed stagnation conditions. Seven specific losses are calculated for each set of compressors geometric variables and inlet velocity diagram characteristics studied. Categories used as input information are compressor geometry, thermodynamic properties of working fluid, velocity diagram characteristics, and iteration limits.

**B73-10322**  
**CHARACTERISTICS OF FORTRAN**

W. R. Garner (Martin Marietta Corp.)  
 Oct. 1973

**LANGLEY-11177**

Publication is announced which outlines source program differences between IBM 360, UNIVAC 1108, CDC 6000, and Honeywell Series 32 computer systems. Publication can be guide to programmer in converting existing program from one computer system to another.

**B73-10344**  
**LOW-COST CODING TECHNIQUES FOR DIGITAL FAULT DIAGNOSIS**

A. Avizienis  
 Aug. 1973 See also JPL-TR-32-1476

**NPO-11701**

Published report discusses fault location properties of arithmetic codes. Criterion for effectiveness of given code is detection probability of local fault by application of checking algorithm to results of entire set of algorithms of processor. Report also presents analysis of arithmetic codes with low-cost check algorithm which possesses partial fault-location properties.

**B73-10360**  
**LOGICAL-FUNCTION GENERATOR**

W. E. Sivertson, Jr.  
 Oct. 1973

**XLA-05099**

Apparatus and technique for generating logical functions and circuits have been developed. They provide aid in designing and constructing hardware to generate logic circuits, by defining circuit connections required to generate these functions. With this method, it is possible quickly and automatically to design logic, while eliminating involved and time-consuming mathematical manipulations.

**B73-10362**  
**COMPUTER PROGRAM TO DETERMINE PRESSURE DISTRIBUTIONS AND FORCES ON BLUNT BODIES OF REVOLUTION**

C. M. Jackson, Jr., W. C. Sawyer, and R. S. Smith  
 Oct. 1973

**LANGLEY-11197**

Program was written to include integration of surface pressure in order to obtain axial-force, normal-force, and pitching-moment coefficients. Program was written in CDC FORTRAN for the CDC-6600 computer system.

**B73-10363**  
**COMPUTER PROGRAM FOR STRESS, VIBRATION, AND BUCKLING CHARACTERISTICS OF GENERAL SHELLS OF REVOLUTION**

G. A. Cohen (Structures Res. Assoc.) and R. T. Haftka (Structures Res. Assoc.)

Sep. 1973

**LANGLEY-11369**

Structures Research Associates (SRA) system of programs is composed of six compatible computer programs for structural analyses of axisymmetric shell structures. Theories and methods upon which these programs are based are presented in documentation. They apply to a common structural model but analyze different modes of structural response.

**B73-10384**  
**IMPROVED PROCEDURES FOR MASS MATRIX-REDUCTIONS IN EIGENVALUE SOLUTIONS**

R. Levy  
 Sep. 1973

**NPO-11619**

Analytical models of three structures were used to test mass matrix-reduction schemes. Accuracy of four mode shapes and frequencies was tracked through successive mass matrix-reductions with diminishing numbers of indicator degrees of freedom. Results were consistently disappointing. Two new procedures were developed in attempt to improve accuracy.

**B73-10418**  
**LOGISTICS HARDWARE AND SERVICES CONTROL SYSTEM**

A. Koromilas (Boeing Co.), K. Miller (Boeing Co.), and T. Lamb (Boeing Co.)

Dec. 1973

**KSC-10819**

Software system permits onsite direct control of logistics operations, which include spare parts, initial installation, tool control, and repairable parts status and control, through all facets of operations. System integrates logistics actions and controls receipts, issues, loans, repairs, fabrications, and modifications and assets in predicting and allocating logistics parts and services effectively.

**B73-10432**  
**MARSHALL SYSTEM FOR AEROSPACE SIMULATION (MARSYAS)**

H. H. Tranboth (Computer Sciences Corp.), A. J. Ventre (Computer Sciences Corp.), W. L. McCollum (Computer Sciences Corp.), T. L. Balentine (Computer Sciences Corp.), and R. Sevigny (Computer Sciences Corp.)

Dec. 1973

## 09 COMPUTER PROGRAMS

### M-FS-22872

System is simple flexible language which can be coded by users unfamiliar with computer programming. It is designed for engineers with little experience in simulation, who desire to simulate large physical systems. User has ability to mix differential equations with diagrams in his model. With few exceptions, there is no rigid statement-operator structure within given modula.

### B73-10443

#### DYNAMIC NONLINEAR ANALYSIS OF SHELLS OF REVOLUTION (DYNASOR II)

J. R. Tillerson (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)

Feb. 1974 See also B73-10446

### JSC-14496

Equations of motion of shell are solved using Houbolt's numerical procedure with nonlinear terms being moved to right-hand side of equilibrium equations and treated as generalized loads. Program was written in FORTRAN IV for IBM 360 or CDC 6000 series computers.

### B73-10444

#### FREQUENCIES AND MODES FOR SHELLS OF REVOLUTION (FAMSOR)

L. B. McWhorter (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)

Feb. 1974 See also B73-10446

### JSC-14497

Using stiffness matrix and lumped-mass representation specified number of natural frequencies are obtained using inverse iteration method. Mode shapes for each frequency are also obtained. These frequencies and mode shapes can be found in reasonable periods of computer time utilizing this code.

### B73-10445

#### THE STATIC NONLINEAR ANALYSIS OF SHELLS OF REVOLUTION (SNASOR II)

J. A. Stricklin (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)

Feb. 1974 See also B73-10446

### JSC-14495

Utilizing stiffness matrices and supplying as input the loading and boundary conditions, program generates equilibrium equations for structure. Nonlinear strain energy terms result in pseudogeneralized forces which are combined with applied generalized forces. Resulting set of nonlinear algebraic equilibrium equations is solved by one of several methods.

### B73-10446

#### STIFFNESS AND MASS MATRICES FOR SHELLS OF REVOLUTION (SAMMSOR II)

J. R. Tillerson (Tex. A&M Univ.) and W. E. Haisler (Tex. A&M Univ.)

Jan. 1974

### JSC-14494

Utilizing element properties, structural stiffness and mass matrices are generated for as many as twenty harmonics and stored on magnetic tape. Matrices generated constitute input data to be used by other stiffness of revolution programs. Variety of boundary and loading conditions can be employed without having to create new mass and stiffness matrices for each case.

### B73-10526

#### STEREOSCOPIC COMPUTER GRAPHICS DISPLAY SYSTEM

H. H. Plott, Jr. (Auburn Univ.) and J. D. Irwin (Auburn Univ.)

Mar. 1974

### M-FS-22322

Handbook was published on study which describes relative merits of two general-purpose, stereoscopic display systems. Both systems are adaptable to most small data processing facilities and, with minimal hardware development, greatly enhance user ability to interact with computer and to interpret data output. Section also describes digital-to-analog converters designed for use with system.

## SUBJECT INDEX

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## Subject Index

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- ASYMPTOTIC SERIES**  
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NPO-11750 B73-10303 09
- ATMOSPHERIC ELECTRICITY**  
Measuring the electric field of a cloud  
KSC-10731 B73-10074 02
- Rocket borne instrument to measure electric fields inside electrified clouds  
KSC-10730 B73-10176 03
- ATMOSPHERIC TEMPERATURE**  
Atmospheric temperature measurements by Raman laser scattering  
LEWIS-12065 B73-10251 03
- ATMOSPHERIC TURBULENCE**  
Laser system detects air turbulence  
M-FS-21244 B73-10210 03
- ATMOSPHERICS**  
An automatic lightning detection and photographic system  
KSC-10728 B73-10043 02
- Measuring the electric field of a cloud  
KSC-10731 B73-10074 02
- ATOMIZERS**  
Air-atomizing splash-cone fuel nozzle reduces pollutant emissions from turbojet engines  
LEWIS-11918 B73-10200 06
- ATOMIZING**  
Experimental verification of computer spray-combustion models  
ARC-10689 B73-10031 03
- ATTITUDE CONTROL**  
Solar aspect determination system  
GSFC-11444 B73-10129 02
- Hybrid coordinate formulation used for the design of attitude control systems for flexible spacecraft  
NPO-11714 B73-10300 09
- Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
NPO-13051 B73-10460 02
- Solid-state controller  
JSC-12384 B73-10468 06
- AUSTENITIC STAINLESS STEELS**  
Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04
- AUTOCLAVING**  
Autoclave heat treatment for prealloyed powder products  
LEWIS-11953 B73-10172 04
- AUTOMATIC CONTROL**  
Automatic speed control of highway traffic  
M-FS-21791 B73-10100 02
- Automatic quadrature control and measuring system  
M-FS-21660 B73-10127 02
- Automatic focus control for facsimile camera  
LANGLEY-11213 B73-10361 02
- Accelerometer-controlled automatic braking system  
LANGLEY-11383 B73-10419 06
- AUTOMATIC FREQUENCY CONTROL**  
Frequency shifting with a solid-state switching capacitor  
HQ-10812 B73-10259 01
- AUTOMATIC TEST EQUIPMENT**  
An ampere-hour meter for batteries  
M-FS-22067 B73-10118 02
- Automated operation of an instrumentation FM tape recorder  
LEWIS-11941 B73-10195 02
- AUTOMATION**  
Automatic microbial transfer  
LANGLEY-11354 B73-10229 05
- AUTOMOBILES**  
Brake wear warning device: A concept  
JSC-19157 B73-10123 02
- System for measuring passenger reaction to transportation-vehicle vibration  
LANGLEY-11353 B73-10436 05
- AUXILIARY PROPULSION**  
Satellite auxiliary propulsion systems  
NPO-11744 B73-10023 06
- AVALANCHE DIODES**  
Oven temperature controller for electronic components  
GSFC-11466 B73-10052 02
- Operational slope-limiting circuit  
NPO-11773 B73-10346 01
- AXIAL COMPRESSION LOADS**  
Fatigue testing device  
LANGLEY-10426 B73-10047 07
- AXIAL FLOW TURBINES**  
Computer program for preliminary design analysis of axial-flow turbines  
LEWIS-11815 B73-10066 09
- AXIAL LOADS**  
Improved fiberglass-to-metal joint produces lighter stronger fiberglass strut  
LEWIS-11661 B73-10258 08
- AXISYMMETRIC BODIES**  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09
- AXISYMMETRIC FLOW**  
Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 B73-10307 09
- AZIMUTH**  
LEAPS (Laser electro-optical alignment pole for surveying)  
GSFC-11262 B73-10122 02

## B

**BACTERIA**

- Rapid detection of bacteria in foods and biological fluids  
GSFC-11738 B73-10045 05
- Bacterial contamination monitor  
GSFC-10879 B73-10222 05

**BACTERICIDES**

- Self-sterilizing polymers  
M-FS-22054 B73-10090 04
- Application of biological filters in water treatment systems  
JSC-14226 B73-10404 05

**BACTERIOLOGY**

- Automatic microbial transfer  
LANGLEY-11354 B73-10229 05
- Measuring micro-organism gas production  
LANGLEY-11326 B73-10241 05
- Biodegradation grinder  
M-FS-22833 B73-10474 05
- Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 B73-10523 05

**BAFFLES**

- Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 B73-10190 07

## BAGS

Industrial filter bags cleaned by high-frequency vibration: A concept  
M-FS-24445 873-10398 06

## BALL BEARINGS

Carbide factor predicts rolling-element bearing fatigue life  
LEWIS-11940 873-10008 07  
Heated bimetal strip prevents damage of bearings by vibration  
NPO-11870 873-10348 06

## BALLS

Thermally actuated valve  
NPO-11846 873-10347 06

## BALSA

Balsa wood as an energy dissipator  
NPO-11839 873-10388 04

## BANDPASS FILTERS

Digital notch filter  
KSC-10182 873-10112 02  
Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 873-10212 03  
Combined diplexer and harmonic filter  
LEWIS-12059 873-10410 02

## BARIUM COMPOUNDS

Ultraviolet reflective coating  
GSFC-11786 873-10469 04

## BATHING

New system for bathing bedridden patients  
ARC-10745 873-10272 05

## BATTERY CHARGERS

An ampere-hour meter for batteries  
M-FS-22067 873-10118 02  
Rechargeable, silver-zinc battery conditioner/monitor unit and state-of-charge indicator  
M-FS-22835 873-10486 02

## BEARING (DIRECTION)

LEAPS (Laser electro-optical alignment pole for surveying)  
GSFC-11262 873-10122 02

## BEARINGS

An electric motor with magnetic bearings: A concept  
XGS-07805 873-10304 01

## BEDS (PROCESS ENGINEERING)

Continuous catalytic decomposition of methane  
ARC-10339 873-10016 03

## BELLOWS

Gas-operated actuator: A concept  
NPO-11369 873-10133 03

## BELTS

Instrument for measuring thin-film belt lengths  
NPO-13149 873-10455 06

## BENDING

Beam lead forming tool  
M-FS-22133 873-10098 07

## BENDING FATIGUE

Carbide factor predicts rolling-element bearing fatigue life  
LEWIS-11940 873-10008 07

## BERYLLIUM

GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 873-10442 01

## BIMETALS

Heated bimetal strip prevents damage of bearings by vibration  
NPO-11870 873-10348 06

## BINARY CODES

Binary concatenated coding system  
JSC-14082 873-10083 09

## BINARY DATA

Minimal hardware, binary sequence pseudonoise generator and detector  
NPO-11406 873-10292 01  
Processor for high-density digital tape-recorded signals  
NPO-11399 873-10354 02

## BINARY DIGITS

Minimum switching network for generating the weight of a binary vector  
NPO-11590 873-10274 09

## BINARY FLUIDS

Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 873-10230 06

## BINARY TO DECIMAL CONVERTERS

High speed direct-binary to binary-coded-decimal converter and scaler  
KSC-10326 873-10281 02

## BINOCULAR VISION

Miniaturized haploscope for testing binocular vision  
ARC-10759 873-10492 05

## BINOCULARS

Miniaturized haploscope for testing binocular vision  
ARC-10759 873-10492 05

## BIOCHEMISTRY

Automated method for study of drug metabolism  
ARC-10469 873-10030 04  
Zeta potential control for electrophoresis cells  
M-FS-22333 873-10260 04

## BIOINSTRUMENTATION

Flexible electroencephalogram (EEG) headband  
LANGLEY-10927 873-10048 05  
Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 873-10236 02  
Electroshock protection circuit  
JSC-14222 873-10261 02

## BIOLOGY

Biodection grinder  
M-FS-22833 873-10474 05

## BIOMEDICAL DATA

Biopotential monitoring with inexpensive office-type cassette recorders  
M-FS-22566 873-10167 02

## BIOMETRICS

A new dry biomedical electrode  
JSC-14321 873-10146 02

## BIOTELEMETRY

Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 873-10236 02  
Eight-channel telephone telemetry system  
JSC-14452 873-10320 05

## BIREFRINGENCE

Light-direction sensor based on birefringency  
NPO-11201 873-10131 03

## BISMUTH TELLURIDES

Thin film thermoelectric devices as thermal control coatings: A study  
M-FS-21384 873-10153 04

## BIT SYNCHRONIZATION

All-digital phase-lock loops for noise-free signals  
NPO-11914 873-10350 01

## BLOOD

Gas chromatography of volatile organic compounds  
JSC-14428 873-10406 04

## BLUNT BODIES

Computer program to determine pressure distributions and forces on blunt bodies of revolution  
LANGLEY-11197 873-10362 09

## BODIES OF REVOLUTION

Computer program to determine pressure distributions and forces on blunt bodies of revolution  
LANGLEY-11197 873-10362 09  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 873-10363 09

## BODY FLUIDS

Rapid detection of bacteria in foods and biological fluids  
GSFC-11738 873-10045 05

## BODY TEMPERATURE

Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 873-10236 02  
Flexible temperature probe for biological systems  
ARC-10796 873-10498 05

## BODY-WING AND TAIL CONFIGURATIONS

Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
LANGLEY-11305 873-10470 06

## BOLTS

Metallic composites as high-temperature fasteners  
M-FS-22438 873-10081 04

## BONDING

Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 873-10079 04  
Self-adjusting assembly jig  
LEWIS-12034 873-10250 07  
Eutectic bonding of sapphire to sapphire  
GSFC-11577 873-10284 08

Materials data handbook on titanium 6Al-4V  
M-FS-22796 873-10372 04

Materials data handbooks on aluminum alloys  
M-FS-22798 873-10373 04

Manufacture of large, lightweight parabolic antennas  
ARC-10741 873-10375 08

Adhesive coating eliminated in new honeycomb-core fabrication process  
LANGLEY-11134 873-10439 08

Strain arrestor plate for mounting rigid insulating tiles  
JSC-14182 873-10465 06

## BOOLEAN FUNCTIONS

Theory and calculus of cubical complexes  
NPO-11491 873-10165 09

## BORON

Large boron-epoxy filament-wound pressure vessels  
NPO-11900 873-10038 08

Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 873-10079 04

Boron-epoxy tubular structure members  
ARC-10737 873-10265 08

## BORON NITRIDES

Low cost uniform heat source  
LEWIS-11903 873-10011 02

- BRAKES (FOR ARRESTING MOTION)**  
Accelerometer-controlled automatic braking system  
LANGLEY-11383 B73-10419 06
- BRAKING**  
Accelerometer-controlled automatic braking system  
LANGLEY-11383 B73-10419 06  
Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
M-FS-22088 B73-10525 02
- BRAZING**  
Diffusion welding tool  
LEWIS-11807 B73-10072 08  
Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 B73-10079 04  
Braze alloys for high temperature service  
LEWIS-11374 B73-10205 06  
Self-adjusting assembly jig  
LEWIS-12034 B73-10250 07  
New concept in brazing metallic honeycomb panels  
LANGLEY-10957 B73-10358 08
- BREATHING APPARATUS**  
Artificial atmosphere control system  
M-FS-22159 B73-10089 05
- BROADBAND AMPLIFIERS**  
Peak-holding circuit for extremely narrow pulses  
JSC-14129 B73-10317 02
- BUCKLING**  
Computer program to compute buckling loads of simply supported anisotropic plates  
LEWIS-11961 B73-10247 09
- BUS CONDUCTORS**  
Digital data command bus  
NPO-11637 B73-10035 01
- C**
- CABLES (ROPES)**  
Emergency-escape device  
M-FS-22720 B73-10369 07
- CALCULATORS**  
Small portable speed calculator  
M-FS-22638 B73-10329 07
- CALCULUS**  
Theory and calculus of cubical complexes  
NPO-11491 B73-10165 09
- CALIBRATING**  
Traveling digital counters for micrometers  
LANGLEY-11258 B73-10042 06  
Measurement of dimensions and alignment with optical instruments  
M-FS-22168 B73-10061 06  
Calibration of dissolved oxygen standard for analysis with methylene blue  
M-FS-22353 B73-10147 04  
Ultrasonic calibration device  
LANGLEY-11435 B73-10420 03  
Automatic PCM guard-band selector and calibrator  
KSC-10812 B73-10510 02
- CALORIMETERS**  
A heat flow calorimeter  
GSFC-11434 B73-10221 03  
Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 B73-10230 06
- CAMERA SHUTTERS**  
A high-speed spectrograph shutter  
HQ-10635 B73-10368 01
- CAMERAS**  
An automatic lightning detection and photographic system  
KSC-10728 B73-10043 02  
Automatic focus control for facsimile camera  
LANGLEY-11213 B73-10361 02  
Motion compensator for holographic motion picture camera  
M-FS-22517 B73-10434 03  
Photography of random motion with a holographic camera  
M-FS-22537 B73-10435 03
- CAPACITANCE SWITCHES**  
Frequency shifting with a solid-state switching capacitor  
HQ-10812 B73-10259 01
- CAPACITORS**  
Compact 20-kiloampere pulse-forming-network capacitor bank  
LEWIS-12009 B73-10171 01  
Complementary MOS four-phase logic circuits  
JSC-14240 B73-10174 01
- CARBIDES**  
Carbide factor predicts rolling-element bearing fatigue life  
LEWIS-11940 B73-10008 07
- CARBON DIOXIDE**  
Catalytic reactor with disposable cartridge  
ARC-10747 B73-10376 04  
Computer system for monitoring radio-repirometry data  
ARC-10784 B73-10494 05
- CARBON DIOXIDE LASERS**  
Laser system detects air turbulence  
M-FS-21244 B73-10210 03  
High-sensitivity receiver for CO2 laser communications  
GSFC-11455 B73-10223 02  
True airspeed measured by airborne laser Doppler velocimeter  
ARC-10763 B73-10506 02
- CARBON FIBERS**  
Preparation of prepreg graphite tape with insoluble polymer  
JSC-14313 B73-10084 04  
Fabrication techniques for polybenzimidazole composites  
ARC-10724 B73-10269 04  
Millimeter-wave antenna system  
GSFC-10949 B73-10333 01
- CARBON 14**  
Computer system for monitoring radio-repirometry data  
ARC-10784 B73-10494 05
- CARBONYL COMPOUNDS**  
Reductive cleavage of the peptide bond  
LRL-10026 B73-10194 04
- CARDIOGRAPHY**  
Improved format for radiocardiographic data  
ARC-10742 B73-10270 05
- CARDIOLOGY**  
Vectorcardiogram  
JSC-14427 B73-10401 02  
Cardiotachometer displays heart rate on a beat-to-beat basis  
M-FS-20284 B73-10477 05
- CARDIOTACHOMETERS**  
Cardiotachometer displays heart rate on a beat-to-beat basis  
M-FS-20284 B73-10477 05
- CARTRIDGES**  
Catalytic reactor with disposable cartridge  
ARC-10747 B73-10376 04
- CASSEGRAIN ANTENNAS**  
Low-noise microwave polarimeter  
NPO-11512 B73-10134 02  
High-gain antenna with singly-curved reflector  
NPO-11361 B73-10291 02
- CASTING**  
Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08  
Method for casting polyethylene pipe  
ARC-10706 B73-10032 08  
Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04
- CATALYSTS**  
Continuous catalytic decomposition of methane  
ARC-10339 B73-10016 03
- CATALYTIC ACTIVITY**  
Catalytic reactor with disposable cartridge  
ARC-10747 B73-10376 04
- CAVITIES**  
SRC seal testing  
M-FS-22426 B73-10199 01
- CDC COMPUTERS**  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09
- CDC 1604 COMPUTER**  
Aerotherm charring materials ablation computer program  
LEWIS-11854 B73-10065 09
- CDC 6000 SERIES COMPUTERS**  
Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
LANGLEY-11250 B73-10183 06  
Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
LANGLEY-11249 B73-10184 06  
Characteristics of FORTRAN  
LANGLEY-11177 B73-10322 09  
Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
JSC-14496 B73-10443 09  
Frequencies and modes for shells of revolution (FAMSOR)  
JSC-14497 B73-10444 09  
The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 B73-10445 09  
Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
JSC-14494 B73-10446 09  
Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 B73-10471 03
- CDC 6400 COMPUTER**  
N-body U and K matrix program  
LEWIS-11438 B73-10012 09  
A linear circuit analysis program with stiff systems capability  
LANGLEY-11184 B73-10091 09  
Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 B73-10307 09

**CDC 6600 COMPUTER**

Medical information management system (MIMS): An automated hospital information system  
 GSFC-11540 B73-10073 09

Computer program to determine pressure distributions and forces on blunt bodies of revolution  
 LANGLEY-11197 B73-10362 09

Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
 LANGLEY-11305 B73-10470 08

**CELLS (BIOLOGY)**

Reproductive cell separation: A concept  
 M-FS-22627 B73-10198 05

**CELLULOSE**

Fire retardant cellulosic foam  
 JSC-14336 B73-10085 04

**CENTRIFUGAL COMPRESSORS**

Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
 LEWIS-12008 B73-10309 09

**CENTRIFUGES**

Electrophoresis separator combining centrifugal separation  
 M-FS-21396 B73-10328 04

**CERAMICS**

Improved mold release for filled-silicone compounds  
 JSC-19300 B73-10338 04

New standoffs provide high-reliability component mounting for printed wiring boards  
 LANGLEY-11176 B73-10512 01

**CHARACTER RECOGNITION**

Image formation in microwave holography  
 ARC-10773 B73-10378 03

**CHARCOAL**

Dynamic technique for measuring adsorption in a gas chromatograph  
 JSC-14083 B73-10339 04

Estimating sorber capacity for multiple contaminants  
 LANGLEY-11056 B73-10424 04

**CHELATES**

Semi-organic structural adhesive for aluminum  
 M-FS-21328 B73-10071 04

**CHEMICAL BONDS**

Reductive cleavage of the peptide bond  
 LRL-10026 B73-10194 04

**CHEMICAL REACTIONS**

Radiochemical synthesis of pure anhydrous metal halides  
 LEWIS-11860 B73-10407 04

**CHEMICAL REACTORS**

Catalytic reactor with disposable cartridge  
 ARC-10747 B73-10376 04

**CHEMICAL STERILIZATION**

Chemical pretreatment for the distillation of urine  
 JSC-14225 B73-10224 04

**CHLOROPHYLLS**

Dye laser remote sensing of marine plankton  
 LANGLEY-11382 B73-10359 05

**CHLOROPRENE RESINS**

Manufacture of large, lightweight parabolic antennas  
 ARC-10741 B73-10375 08

**CHROMATOGRAPHY**

TLC determination of functionality in prepolymers  
 NPO-11731 B73-10037 04

'Dry-column' chromatography of plant pigments  
 ARC-10780 B73-10271 04

**CHROMIUM ALLOYS**

Oxidation resistant, thorium-dispersed nickel-chromium-aluminum alloy  
 LEWIS-11541 B73-10077 04

**CIRCUIT BOARDS**

A new packaging and testing concept for microelectronic components  
 M-FS-20936 B73-10109 01

Positive contact resistance soldering unit  
 KSC-10242 B73-10145 02

Welded printed circuit (pc) stick  
 GSFC-11773 B73-10393 01

New standoffs provide high-reliability component mounting for printed wiring boards  
 LANGLEY-11176 B73-10512 01

**CIRCUIT BREAKERS**

Thermally responsive mechanical actuator  
 GSFC-11697 B73-10208 04

Logic controlled solid state switchgear  
 LEWIS-12044 B73-10408 02

**CIRCUIT PROTECTION**

Electroshock protection circuit  
 JSC-14222 B73-10261 02

Fail-safe bidirectional valve driver  
 NPO-11958 B73-10450 07

**CIRCUITS**

Complementary MOS four-phase logic circuits  
 JSC-14240 B73-10174 01

**CIRCULAR CYLINDERS**

Thermally actuated valve  
 NPO-11846 B73-10347 06

**CIRCULAR POLARIZATION**

Microstrip antennas  
 LANGLEY-11284 B73-10179 01

Circularly-polarized multiband telemetry tracking antenna  
 NPO-11264 B73-10288 02

**CIRCULAR SHELLS**

Production of circular polymer-glass fabric composites  
 M-FS-22125 B73-10069 04

**CIRCULATION**

Bimetallic devices for stirring fluids  
 ARC-10441 B73-10029 06

**CLAYS**

Rubber composition compatible with hydrazine  
 NPO-11440 B73-10019 04

**CLEANING**

Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
 LEWIS-11963 B73-10188 04

Industrial filter bags cleaned by high-frequency vibration: A concept  
 M-FS-24445 B73-10398 06

Backflushing system rapidly cleans fluid filters  
 JSC-14273 B73-10405 06

Procedure for dispersing fiber bundles  
 LANGLEY-11224 B73-10438 08

**CLEANLINESS**

Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
 LEWIS-11963 B73-10188 04

Container seal for dusty environment  
 LANGLEY-10962 B73-10416 07

**CLEARANCES**

Low-cost clearance indicator for high speed turbomachinery  
 LEWIS-12128 B73-10411 02

**CLOCKS**

A fault-tolerant clock  
 JSC-12531 B73-10218 09

Inexpensive programmable computer clock  
 LEWIS-11797 B73-10308 02

Small portable speed calculator  
 M-FS-22638 B73-10329 07

**CLOTHING**

A versatile flammability test chamber  
 KSC-10126 B73-10111 06

**CLOUDS (METEOROLOGY)**

Measuring the electric field of a cloud  
 KSC-10731 B73-10074 02

**CLUTCHES**

Magnetic particle clutch controls servo system  
 JSC-17136 B73-10041 06

**COALESCING**

Separation of gas from liquid in a two-phase flow system  
 NPO-11556 B73-10383 03

**COATINGS**

Nonflammable potting-encapsulating and conformal coating compounds  
 JSC-14164 B73-10102 04

Ultraviolet reflective coating  
 GSFC-11786 B73-10469 04

X-ray opaque additive for inspection of weld joints  
 M-FS-22896 B73-10528 08

**COAXIAL CABLES**

Digital data command bus  
 NPO-11637 B73-10035 01

A vacuum chamber feedthrough  
 M-FS-21133 B73-10152 01

Design method for minimizing RF voltage breakdown  
 NPO-13408 B73-10520 01

**COBALT**

Continuous catalytic decomposition of methane  
 ARC-10339 B73-10016 03

**COBALT ALLOYS**

Autoclave heat treatment for prealloyed powder products  
 LEWIS-11953 B73-10172 04

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
 LEWIS-11610 B73-10206 03

**COBOL**

Automated data management information system (ADMIS)  
 KSC-10619 B73-10053 09

Logistics hardware and services control system  
 KSC-10819 B73-10418 09

**CODING**

Binary concatenated coding system  
 JSC-14082 B73-10083 09

Flexible format, computer accessed telemetry system  
 NPO-11358 B73-10290 02

**COHERENT LIGHT**

Laser velocimeter for simultaneous two-dimensional velocity measurements  
 ARC-10637 B73-10267 02

**COHERENT RADIATION**

A nonlinear-coherence receiver  
 NPO-11921 B73-10144 02

Coherence-length extender  
M-FS-22434 B73-10399 03

**COLLISIONS**  
A real time moving-scene holographic camera  
M-FS-21087 B73-10421 03

**COLLOIDING**  
Automatic device for shell freezing of liquids  
GSFC-11737 B73-10253 04

**COLOR TELEVISION**  
Television noise-reduction device  
JSC-12607 B73-10431 02

**COLORIMETRY**  
Automated method for study of drug metabolism  
ARC-10469 B73-10030 04

**COMBUSTION CHAMBERS**  
Experimental verification of computer spray-combustion models  
ARC-10689 B73-10031 03  
Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 B73-10233 09  
Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07

**COMBUSTION EFFICIENCY**  
Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07

**COMBUSTION PRODUCTS**  
Autoignition test cell with flexible atmosphere control  
KSC-10198 B73-10113 04

**COMFORT**  
Integral aircraft passenger seat  
ARC-10799 B73-10495 05

**COMMAND AND CONTROL**  
Logistics hardware and services control system  
KSC-10819 B73-10418 09

**COMMERCIAL AIRCRAFT**  
Integral aircraft passenger seat  
ARC-10799 B73-10495 05

**COMMUNICATION**  
Motivation techniques for supervision  
JSC-19187 B73-10448 05

**COMMUNICATION CABLES**  
Flat conductor cable survey  
M-FS-22493 B73-10055 01

**COMMUNICATION EQUIPMENT**  
A closed, digital telephone system  
JSC-13912 B73-10226 02  
Eight-channel telephone telemetry system  
JSC-14452 B73-10320 05

**COMMUTATION**  
Flexible format, computer accessed telemetry system  
NPO-11358 B73-10290 02

**COMMUTATORS**  
Impulse commutating circuit with transformer to limit reapplied voltage  
LEWIS-11849 B73-10004 01  
Data multiplexer using a tree switch  
NPO-11333 B73-10289 02

**COMPARATOR CIRCUITS**  
Gated compressor, distortionless signal limiter  
NPO-11820 B73-10387 01

**COMPATIBILITY**  
Rubber composition compatible with hydrazine  
NPO-11440 B73-10019 04

Long-term material compatibility testing system  
NPO-11776 B73-10385 04

**COMPONENT RELIABILITY**  
An improved method for obtaining a normalized junction temperature for semiconductor: A concept  
JSC-14136 B73-10196 01

**COMPOSITE MATERIALS**  
Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08  
Fiber composite materials: A survey of fiber matrix interface mechanics  
LEWIS-11924 B73-10007 04  
Technique for the polymerization of monomers for PPO/graphite fiber composites  
LEWIS-11879 B73-10014 04  
An inexpensive and effective method for calculating the strength of randomly reinforced fiber composites  
LEWIS-11985 B73-10039 04  
Residual stress effects on the impact resistance and strength of fiber composites  
LEWIS-11984 B73-10063 04  
Metal-metal reinforced laminar composites  
LEWIS-11790 B73-10068 04  
Production of circular polymer-glass fabric composites  
M-FS-22125 B73-10069 04  
Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 B73-10079 04  
Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04  
Preparation of prepreg graphite tape with insoluble polymer  
JSC-14313 B73-10084 04  
Lightweight graphite/polyimide panels  
JSC-14375 B73-10121 04  
A new concept for joining dissimilar composites  
M-FS-24307 B73-10148 04  
Computer program to compute buckling loads of simply supported anisotropic plates  
LEWIS-11961 B73-10247 09  
Graphite/polyimide laminates with near-zero thermal expansion  
JSC-17862 B73-10254 04  
Boron-epoxy tubular structure members  
ARC-10737 B73-10265 08  
Fabrication techniques for polybenzimidazole composites  
ARC-10724 B73-10269 04  
Design Guide for glass fiber reinforced metal pressure vessel  
LEWIS-12042 B73-10311 08  
Preparing thermoplastic aromatic polyimides  
LANGLEY-11372 B73-10319 04  
Articulated elastic-loop roving vehicles  
M-FS-22691 B73-10326 06  
Millimeter-wave antenna system  
GSFC-10949 B73-10333 01  
Manufacture of large, lightweight parabolic antennas  
ARC-10741 B73-10375 08  
Backflushing system rapidly cleans fluid filters  
JSC-14273 B73-10405 06

Strain arrestor plate for mounting rigid insulating tiles  
JSC-14182 B73-10465 06  
Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04

**COMPOSITE STRUCTURES**  
Adhesive coating eliminated in new honeycomb-core fabrication process  
LANGLEY-11134 B73-10439 08

**COMPOSITE WRAPPING**  
Large boron-epoxy filament-wound pressure vessels  
NPO-11900 B73-10038 08  
Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08

**COMPRESSIBLE FLOW**  
Computer program for compressible flow network analysis  
LEWIS-11859 B73-10246 09  
Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
LEWIS-11996 B73-10248 09  
Computer program for predicting symmetric jet mixing of compressible flow in jets  
ARC-10730 B73-10263 09

**COMPRESSOR EFFICIENCY**  
Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
LEWIS-12008 B73-10309 09

**COMPUTER COMPONENTS**  
A fault-tolerant clock  
JSC-12531 B73-10218 09  
Inexpensive programmable computer clock  
LEWIS-11797 B73-10308 02  
Electro-optical device for monitoring wire size  
LANGLEY-11358 B73-10321 02

**COMPUTER DESIGN**  
Image data rate converter: A concept  
NPO-11659 B73-10277 02

**COMPUTER GRAPHICS**  
Digital video display system  
NPO-11342 B73-10132 02  
Numerical interactive controller  
NPO-11497 B73-10294 02  
Stereoscopic computer graphics display system  
M-FS-22322 B73-10526 09

**COMPUTER PROGRAMS**  
N-body U and K matrix program  
LEWIS-11438 B73-10012 09  
Large boron-epoxy filament-wound pressure vessels  
NPO-11900 B73-10038 08  
A comprehensive program for textual concordances and statistics  
JSC-17484 B73-10049 09  
Automated data management information system (ADMIS)  
KSC-10619 B73-10053 09  
Computer program for transient response of structural rings subjected to fragment impact  
LEWIS-11926 B73-10064 09  
Aerotherm charring materials ablation computer program  
LEWIS-11854 B73-10065 09  
Computer program for preliminary design analysis of axial-flow turbines  
LEWIS-11815 B73-10086 09

Medical information management system (MIMS): An automated hospital information system  
 GSFC-11540                      B73-10073 09  
 PPUAS--photopeak unfolding and self-shielding program  
 NPO-13188                      B73-10087 09  
 A general purpose maneuver turns computer program  
 NPO-13213                      B73-10088 09  
 A linear circuit analysis program with stiff systems capability  
 LANGLEY-11184                  B73-10091 09  
 Eigenvalue routine by Sturm sequence method  
 NPO-11805                      B73-10114 09  
 Automated Shell Theory for Rotating Structures (ASTROS)  
 M-FS-21970                      B73-10115 09  
 Ascent control analysis for S-II derivative launch vehicles, digital computer program  
 M-FS-24324                      B73-10120 09  
 Computer-controlled vibration testing  
 NPO-11612                      B73-10138 02  
 GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512                      B73-10162 09  
 Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
 LANGLEY-11250                  B73-10183 06  
 Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
 LANGLEY-11249                  B73-10184 06  
 Pressure drop and pumping power for fluid flow through round tubes  
 M-FS-24172                      B73-10188 09  
 Computer program for the design of toroidal transformers  
 LEWIS-11878                      B73-10214 09  
 Spectral analysis program (SAP)  
 JSC-14310                      B73-10227 09  
 Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
 LEWIS-11997                      B73-10231 09  
 A computer program for calculating design and off-design performance for turbojet and turbofan engines  
 LEWIS-12010                      B73-10232 09  
 Computer program to determine the irrotational nozzle admittance  
 LEWIS-12019                      B73-10233 09  
 Method for predicting rotor free-wake positions and the resulting rotor blade airloads  
 LANGLEY-10674                  B73-10239 06  
 Computer program to determine roots of polynomials by ratio of successive derivatives  
 LEWIS-11809                      B73-10244 09  
 A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
 LEWIS-12011                      B73-10245 09  
 Computer program for compressible flow network analysis  
 LEWIS-11859                      B73-10246 09  
 Computer program to compute buckling loads of simply supported anisotropic plates  
 LEWIS-11961                      B73-10247 09

Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
 LEWIS-11996                      B73-10248 09  
 Computer program for predicting symmetric jet mixing of compressible flow in jets  
 ARC-10730                      B73-10263 09  
 Node-recording method for stiffness matrix wavefront reduction in structural analysis  
 NPO-11620                      B73-10296 09  
 Computer program for the prediction of reorientation flow dynamics  
 LEWIS-11816                      B73-10307 09  
 Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
 LEWIS-12008                      B73-10309 09  
 Characteristics of FORTRAN  
 LANGLEY-11177                  B73-10322 09  
 Computer program to determine pressure distributions and forces on blunt bodies of revolution  
 LANGLEY-11197                  B73-10362 09  
 Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
 LANGLEY-11369                  B73-10363 09  
 Logistics hardware and services control system  
 KSC-10819                      B73-10418 09  
 Marshall system for aerospace simulation (MARSYAS)  
 M-FS-22672                      B73-10432 09  
 Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
 JSC-14496                      B73-10443 09  
 Frequencies and modes for shells of revolution (FAMSOR)  
 JSC-14497                      B73-10444 09  
 The static nonlinear analysis of shells of revolution (SNASOR II)  
 JSC-14495                      B73-10445 09  
 Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
 JSC-14494                      B73-10446 09  
 Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
 LANGLEY-11305                  B73-10470 06  
 Improved method for design of expansion-chamber mufflers with application to operational helicopter  
 LANGLEY-11548                  B73-10471 03  
 Stereoscopic computer graphics display system  
 M-FS-22322                      B73-10526 09

**COMPUTER STORAGE DEVICES**  
 Braid read-only memory  
 NPO-11570                      B73-10136 01  
 Tetrad bubble domain chip arrangement for multiplexing  
 M-FS-22296                      B73-10202 02  
 Hologram recording tubes  
 M-FS-22590                      B73-10330 03

**COMPUTER TECHNIQUES**  
 A generalized approach to computer synthesis of digital holograms  
 M-FS-21973                      B73-10101 09  
 Improved noise-adding radiometer for microwave receivers  
 NPO-11706                      B73-10345 02  
 Computer system for monitoring radio-repirometry data  
 ARC-10784                      B73-10494 05

**COMPUTERIZED SIMULATION**  
 GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512                      B73-10162 09  
 Marshall system for aerospace simulation (MARSYAS)  
 M-FS-22672                      B73-10432 09

**CONDENSATES**  
 Condensate-removal device for heat exchangers  
 JSC-14143                      B73-10429 06

**CONDENSERS (LIQUIFIERS)**  
 Condensate-removal device for heat exchangers  
 JSC-14143                      B73-10429 06

**CONDUCTIVE HEAT TRANSFER**  
 Thermal contact resistance in a non-ideal joint  
 M-FS-21775                      B73-10105 03

**CONICAL NOZZLES**  
 Air-atomizing splash-cone fuel nozzle reduces pollutant emissions from turbojet engines  
 LEWIS-11918                      B73-10200 06

**CONICAL SCANNING**  
 High-gain antenna with singly-curved reflector  
 NPO-11361                      B73-10291 02  
 Multiple-reflection conical microwave antenna  
 NPO-11661                      B73-10299 02

**CONTAMINANTS**  
 Estimating sorber capacity for multiple contaminants  
 LANGLEY-11056                  B73-10424 04

**CONTAMINATION**  
 Bacterial contamination monitor  
 GSFC-10879                      B73-10222 05  
 Chemical pretreatment for the distillation of urine  
 JSC-14225                      B73-10224 04

**CONTINUOUS WAVE RADAR**  
 Junction range finder  
 KSC-10108                      B73-10191 02

**CONTOURS**  
 Improved discrimination in photographic density contouring  
 JSC-12588                      B73-10441 03

**CONTRACT MANAGEMENT**  
 GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512                      B73-10162 09

**CONTROL BOARDS**  
 Rechargeable, silver-zinc battery conditioner/monitor unit and state-of-charge indicator  
 M-FS-22835                      B73-10486 02

**CONTROL EQUIPMENT**  
 Automatic quadrature control and measuring system  
 M-FS-21660                      B73-10127 02  
 Fail-safe bidirectional valve driver  
 NPO-11958                      B73-10450 07  
 Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
 M-FS-22088                      B73-10525 02

**CONTROLLED ATMOSPHERES**  
 Artificial atmosphere control system  
 M-FS-22159                      B73-10089 05  
 Autoignition test cell with flexible atmosphere control  
 KSC-10198                      B73-10113 04

**CONTROLLERS**  
 Logic controlled solid state switchgear  
 LEWIS-12044                      B73-10408 02

- Solid-state controller  
JSC-12394 B73-10466 06  
Versatile, analog-to-digital, power-regulator controller  
NPO-13178 B73-10467 02
- CONVERSION TABLES**  
Design parameters for toroidal and bobbin magnetics  
NPO-13441 B73-10459 01
- CONVEYORS**  
Ferrofluid separator for nonferrous scrap separation  
LANGLEY-11523 B73-10463 07
- COOLANTS**  
Gettering capsule for removing oxygen from liquid lithium systems  
LEWIS-11509 B73-10002 04
- COOLING**  
A practical solar energy heating and cooling system  
M-FS-22563 B73-10156 05
- COPPER**  
X-ray opaque additive for inspection of weld joints  
M-FS-22896 B73-10528 08
- CORE STORAGE**  
Braid<sup>2</sup> read-only memory  
NPO-11570 B73-10136 01  
Tetrad bubble domain chip arrangement for multiplexing  
M-FS-22296 B73-10202 02  
Hologram recording tubes  
M-FS-22590 B73-10330 03
- CORRELATION DETECTION**  
Single-channel digital command-detection system  
NPO-11302 B73-10342 02
- CORROSION RESISTANCE**  
Materials data handbook on titanium 6Al-4V  
M-FS-22796 B73-10372 04  
Materials data handbooks on aluminum alloys  
M-FS-22798 B73-10373 04  
Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04  
Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04
- CORRUGATED PLATES**  
Corrugated battery electrode  
GSFC-11368 B73-10515 01  
Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- COSMIC DUST**  
Cosmic dust or other similar outer-space particles location detector  
GSFC-11291 B73-10282 02
- COST ANALYSIS**  
A method for economic evaluation of redundancy levels for aerospace systems  
KSC-10754 B73-10067 09
- COST EFFECTIVENESS**  
Satellite auxiliary propulsion systems  
NPO-11744 B73-10023 06
- COUNTERS**  
Traveling digital counters for micrometers  
LANGLEY-11258 B73-10042 06
- CRACK PROPAGATION**  
Fatigue testing device  
LANGLEY-10426 B73-10047 07  
Probability of stress-corrosion fracture under random loading  
NPO-13113 B73-10453 04
- CRACKS**  
Prototype ultrasonic instrument for quantitative testing  
M-FS-22350 B73-10051 02
- CREATININE**  
Increasing the sensitivity of the Jaffe reaction for creatinine  
NPO-11587 B73-10021 04
- CREEP STRENGTH**  
Creep-fatigue analysis by Strainrange Partitioning  
LEWIS-12072 B73-10314 04
- CRYOGENIC EQUIPMENT**  
Magnetocaloric pump  
LEWIS-11672 B73-10124 07  
Self-powered mixer for pressurized containers  
LEWIS-12054 B73-10312 03  
Monel-shot and screen regenerators  
GSFC-11593 B73-10462 03
- CRYOGENIC FLUID STORAGE**  
Bimetallic devices for stirring fluids  
ARC-10441 B73-10029 06  
Geysering inhibitor pipe  
KSC-10615 B73-10110 07  
Effects of environmental exposure on cryogenic thermal insulation materials  
LEWIS-12007 B73-10213 04
- CRYOGENIC ROCKET PROPELLANTS**  
Geysering inhibitor pipe  
KSC-10615 B73-10110 07
- CRYSTAL GROWTH**  
Vapor phase growth of group 3, 4, and 5 compounds by HCl transport of elements  
LANGLEY-11144 B73-10056 04  
Fabrication of magnetic bubble memory overlay  
M-FS-22377 B73-10096 01
- CRYSTAL OSCILLATORS**  
Oven temperature controller for electronic components  
GSFC-11466 B73-10052 02  
All-digital phase-lock loops for noise-free signals  
NPO-11914 B73-10350 01  
Frequency control circuit for all-digital phase-lock loops  
NPO-11936 B73-10351 01
- CRYSTALS**  
A new optical recording medium  
M-FS-22348 B73-10095 03
- CURRENT AMPLIFIERS**  
A new dry biomedical electrode  
JSC-14321 B73-10146 02
- CURRENT REGULATORS**  
Versatile, analog-to-digital, power-regulator controller  
NPO-13178 B73-10467 02
- CUTTERS**  
Apparatus for cutting elastomeric materials  
NPO-13146 B73-10521 07
- CUTTING**  
Apparatus for cutting elastomeric materials  
NPO-13146 B73-10521 07
- CYLINDERS**  
Analysis of nonlinear vibrations of cylinders  
NPO-11736 B73-10302 09
- D**
- DAMAGE**  
Recovery of recordings from heat damaged magnetic tapes  
JSC-14219 B73-10173 02
- DATA ACQUISITION**  
Automatic carrier acquisition system for phase-lock-loop receivers  
NPO-11628 B73-10343 02
- DATA CONVERTERS**  
Image data rate converter: A concept  
NPO-11659 B73-10277 02
- DATA MANAGEMENT**  
Automated data management information system (ADMIS)  
KSC-10619 B73-10053 09  
Medical information management system (MIMS): An automated hospital information system  
GSFC-11540 B73-10073 09  
Synchronous ten-megabit biphasic detector  
M-FS-22546 B73-10323 02
- DATA PROCESSING**  
Binary concatenated coding system  
JSC-14082 B73-10083 09  
Simultaneous processing of vibration test data  
NPO-11616 B73-10139 01  
Processor for high-density digital tape-recorded signals  
NPO-11399 B73-10354 02  
Data-matched filter  
JSC-14264 B73-10449 02  
Stereoscopic computer graphics display system  
M-FS-22322 B73-10526 09
- DATA RECORDERS**  
Traveling digital counters for micrometers  
LANGLEY-11258 B73-10042 06  
Automatic PCM guard-band selector and calibrator  
KSC-10812 B73-10510 02
- DATA RECORDING**  
A new optical recording medium  
M-FS-22348 B73-10095 03  
An improved holographic recording medium  
M-FS-22532 B73-10166 09  
Sampling command generator corrects for noise and dropouts in recorded data  
NPO-11886 B73-10390 01
- DATA REDUCTION**  
Digital slope-threshold data compressor  
NPO-11630 B73-10355 02  
Data compression by a decreasing slope-threshold test  
NPO-10769 B73-10382 02
- DATA SAMPLING**  
Sampling command generator corrects for noise and dropouts in recorded data  
NPO-11886 B73-10390 01
- DATA STORAGE**  
Fabrication of magnetic bubble memory overlay  
M-FS-22377 B73-10096 01  
Laser addressed holographic memory system  
M-FS-22565 B73-10155 03  
Bipotential monitoring with inexpensive office-type cassette recorders  
M-FS-22566 B73-10167 02

DATA TRANSMISSION

Flexible format, computer accessed telemetry system  
 NPO-11358 B73-10290 02  
 Laser-actuated holographic storage device  
 M-FS-22768 B73-10423 03

DATA TRANSMISSION

Pre-emphasis determination for an S-band constant bandwidth FM/FM station  
 M-FS-22135 B73-10170 02  
 Data multiplexer using a tree switch  
 NPO-11333 B73-10289 02  
 Digital slope-threshold data compressor  
 NPO-11630 B73-10355 02  
 Data compression by a decreasing slope-threshold test  
 NPO-10769 B73-10382 02  
 Digital transmitter for data bus communications system  
 JSC-14558 B73-10511 02

DECISION MAKING

GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512 B73-10162 09

DECODING

Four-phase differential phase shift resolver  
 JSC-14065 B73-10093 02  
 Synchronous ten-megabit biphasic detector  
 M-FS-22546 B73-10323 02

DECOMPOSITION

Continuous catalytic decomposition of methane  
 ARC-10339 B73-10016 03  
 Catalytic reactor with disposable cartridge  
 ARC-10747 B73-10376 04

DEEP SPACE NETWORK

Improved noise loading radiometer for microwave receivers  
 NPO-11706 B73-10345 02  
 Probes for measuring noise current in an electronic cable  
 NPO-13123 B73-10454 02

DEFLECTION

Laser system detects tower deflections  
 LEWIS-11870 B73-10243 02

DEHYDRATED FOOD

Preservation of flavor in freeze dried green beans  
 JSC-14149 B73-10092 05

DEHYDRATION

Preservation of flavor in freeze dried green beans  
 JSC-14149 B73-10092 05

DEMODULATION

Four-phase differential phase shift resolver  
 JSC-14065 B73-10093 02  
 Carrier extraction circuit  
 JSC-14262 B73-10094 02  
 A technique to eliminate false lock in PCM demodulation  
 JSC-12494 B73-10108 02  
 Phase shift keyed, pulse code modulated signal synchronizer  
 JSC-12462 B73-10107 02

DEMODULATORS

Data-aided carrier tracking loops  
 NPO-11282 B73-10356 01

DENSIFICATION

Densification of powder metallurgy billets by a roll consolidation technique  
 LEWIS-11395 B73-10040 08

DEOXYGENATION

Gettering capsule for removing oxygen from liquid lithium systems  
 LEWIS-11509 B73-10002 04

DEPTH MEASUREMENT

A simple, accurate depth check gauge  
 JSC-17166 B73-10150 06

DETECTION

Bacterial contamination monitor  
 GSFC-10879 B73-10222 05

DIAGNOSIS

Low-cost coding techniques for digital fault diagnosis  
 NPO-11701 B73-10344 09

DIALYSIS

Automated method for study of drug metabolism  
 ARC-10469 B73-10030 04

DIAPHRAGMS (MECHANICS)

Embossed metal diaphragm has two-way stretch  
 NPO-11635 B73-10298 08

DIELECTRICS

Insulated ECG electrodes  
 JSC-14339 B73-10220 05

DIETS

Potassium food supplement  
 JSC-14391 B73-10177 05

DIFFERENTIAL AMPLIFIERS

Integrable power gyrator  
 M-FS-22342 B73-10159 02  
 Gyrator circuit using field effect transistors  
 M-FS-21433 B73-10161 02

DIFFERENTIAL EQUATIONS

Use of multivariable asymptotic expansions in a satellite theory  
 NPO-11750 B73-10303 09  
 Marshall system for aerospace simulation (MARSYAS)  
 M-FS-22672 B73-10432 09

DIFFERENTIAL PRESSURE

Leak detector-measurer  
 M-FS-21761 B73-10203 07

DIFFUSION

Stable palladium alloys for diffusion of hydrogen  
 NPO-11747 B73-10024 04

DIFFUSION WELDING

Improved diffusion welding and roll welding of titanium alloys  
 LEWIS-11852 B73-10005 08  
 Diffusion welding tool  
 LEWIS-11807 B73-10072 08  
 Fatigue of boron-aluminum composites bonds and joints  
 M-FS-22325 B73-10079 04

DIGITAL COMMAND SYSTEMS

Digital servo controller behaves like synchro  
 KSC-10769 B73-10337 02  
 Single-channel digital command-detection system  
 NPO-11302 B73-10342 02

DIGITAL COMPUTERS

Computer-controlled vibration testing  
 NPO-11812 B73-10138 02  
 Stereoscopic computer graphics display system  
 M-FS-22322 B73-10526 09

DIGITAL DATA

Digital data command bus  
 NPO-11637 B73-10035 01  
 Traveling digital counters for micrometers  
 LANGLEY-11258 B73-10042 06

A generalized approach to computer synthesis of digital holograms  
 M-FS-21973 B73-10101 09  
 Digital video display system  
 NPO-11342 B73-10132 02  
 Digital TV image enhancement system  
 GSFC-11256 B73-10285 02  
 Flexible format, computer accessed telemetry system  
 NPO-11358 B73-10290 02  
 RF to digital converter  
 JSC-14419 B73-10306 02  
 Processor for high-density digital tape-recorded signals  
 NPO-11399 B73-10354 02  
 Digital slope-threshold data compressor  
 NPO-11630 B73-10355 02  
 Cardiotachometer displays heart rate on a beat-to-beat basis  
 M-FS-20284 B73-10477 05  
 Subminiature micropower digital recorder  
 ARC-10746 B73-10491 02

DIGITAL FILTERS

Digital notch filter  
 KSC-10182 B73-10112 02

DIGITAL SYSTEMS

A remote test parameter profile display  
 LEWIS-11872 B73-10006 02  
 A closed, digital telephone system  
 JSC-13912 B73-10226 02  
 High speed direct-binary to binary-coded-decimal converter and scaler  
 KSC-10326 B73-10281 02  
 Numerical interactive controller  
 NPO-11497 B73-10294 02  
 Digital servo control of random sound fields  
 NPO-11623 B73-10297 02  
 All-digital phase-lock loops for noise-free signals  
 NPO-11914 B73-10350 01  
 Frequency control circuit for all-digital phase-lock loops  
 NPO-11936 B73-10351 01  
 Digital transmitter for data bus communications system  
 JSC-14558 B73-10511 02

DIGITAL TECHNIQUES

Ascent control analysis for S-II derivative launch vehicles, digital computer program  
 M-FS-24324 B73-10120 09  
 Digital random-number generator  
 ARC-10096 B73-10266 09  
 Minimal hardware, binary sequence pseudonoise generator and detector  
 NPO-11406 B73-10292 01  
 Low-cost coding techniques for digital fault diagnosis  
 NPO-11701 B73-10344 09  
 Versatile, analog-to-digital, power-regulator controller  
 NPO-13178 B73-10467 02

DIGITAL TO ANALOG CONVERTERS

A remote test parameter profile display  
 LEWIS-11872 B73-10006 02  
 Time-based priority selection for analog circuits  
 M-FS-24242 B73-10154 02  
 A closed, digital telephone system  
 JSC-13912 B73-10226 02

DIODES

Fail-safe bidirectional valve driver  
 NPO-11958 B73-10450 07  
 High-power microstrip switch  
 NPO-11965 B73-10451 02

**DIPLEXERS**

Combined diplexer and harmonic filter  
LEWIS-12059 B73-10410 02

**DIRECTIONAL ANTENNAS**

Circularly-polarized multiband telemetry tracking antenna  
NPO-11264 B73-10288 02  
Digital servo controller behaves like synchro  
KSC-10769 B73-10337 02

**DISCONNECT DEVICES**

Thermally responsive mechanical actuator  
GSFC-11697 B73-10208 04

**DISCRIMINATION**

Improved discrimination in photographic density contouring  
JSC-12588 B73-10441 03

**DISCRIMINATORS**

Peak-holding circuit for extremely narrow pulses  
JSC-14129 B73-10317 02

**DISPERSING**

Procedure for dispersing fiber bundles  
LANGLEY-11224 B73-10438 08

**DISPLAY DEVICES**

A remote test parameter profile display  
LEWIS-11872 B73-10006 02  
Video enhancement of X-ray and neutron radiographs  
LEWIS-11944 B73-10009 03

Digital video display system  
NPO-11342 B73-10132 02

Numerical interactive controller  
NPO-11497 B73-10294 02

Alphanumeric character generator for oscilloscope  
GSFC-11582 B73-10370 02

RF antenna-pattern visual aids for field use  
KSC-10821 B73-10426 02

Cardiotachometer displays heart rate on a beat-to-beat basis  
M-FS-20284 B73-10477 05

Stereoscopic computer graphics display system  
M-FS-22322 B73-10526 09

**DISTANCE MEASURING EQUIPMENT**

Determining distance to lightning strokes from a single station  
KSC-10698 B73-10178 02

**DISTILLATION**

Chemical pretreatment for the distillation of urine  
JSC-14225 B73-10224 04

Design of a unit to produce hot distilled water for the same power consumption as a water heater  
JSC-14224 B73-10402 04

**DISTILLATION EQUIPMENT**

Design of a unit to produce hot distilled water for the same power consumption as a water heater  
JSC-14224 B73-10402 04

**DOCUMENT STORAGE**

Laser-actuated holographic storage device  
M-FS-22768 B73-10423 03

**DOPPLER EFFECT**

Laser system detects air turbulence  
M-FS-21244 B73-10210 03

Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 B73-10282 03

Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 B73-10267 02

Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 B73-10371 04

Motion compensator for holographic motion picture camera  
M-FS-22517 B73-10434 03

**DOPPLER RADAR**

True airspeed measured by airborne laser Doppler velocimeter  
ARC-10763 B73-10506 02

**DRILLING**

Universal drill jig  
M-FS-24464 B73-10324 07

**DROP SIZE**

Experimental verification of computer spray-combustion models  
ARC-10689 B73-10031 03

**DRUGS**

Automated method for study of drug metabolism  
ARC-10469 B73-10030 04

**DUCTED FLOW**

A theoretical study of aerodynamic noise generation  
M-FS-24167 B73-10209 03

**DUST**

Container seal for dusty environment  
LANGLEY-10962 B73-10416 07

**DYE LASERS**

A laser head for simultaneous optical pumping of several dye lasers  
LANGLEY-11341 B73-10336 03

Dye laser remote sensing of marine plankton  
LANGLEY-11382 B73-10359 05

**DYES**

Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 B73-10027 03

**DYNAMIC CHARACTERISTICS**

Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
JSC-14496 B73-10443 09

**DYNAMIC PROGRAMMING**

A summary report on system effectiveness and optimization study  
M-FS-22126 B73-10104 09

**DYNAMIC RESPONSE**

Mathematical model for predicting human vertebral fracture  
ARC-10691 B73-10033 05

Dynamic testing of complex structures  
JSC-12569 B73-10057 06

Versatile electronic load  
NPO-13202 B73-10458 03

**DYNAMIC STRUCTURAL ANALYSIS**

Dynamic testing of complex structures  
JSC-12569 B73-10057 06

Thermal-dynamic modeling study  
LANGLEY-11309 B73-10076 06

**DYNAMOMETERS**

Accelerometer-controlled automatic braking system  
LANGLEY-11383 B73-10419 06

**E****ECONOMIC ANALYSIS**

A method for economic evaluation of redundancy levels for aerospace systems  
KSC-10754 B73-10067 09

**EDUCATION**

Motivation techniques for supervision  
JSC-19187 B73-10448 06

**EIGENVALUES**

Eigenvalue routine by Sturm sequence method  
NPO-11805 B73-10114 09

Improved procedures for mass matrix-reductions in eigenvalue solutions  
NPO-11619 B73-10384 09

**ELASTIC SCATTERING**

Elastic light-scattering modulator: A concept  
M-FS-22724 B73-10422 03

**ELASTOMERS**

Manufacture and quality control of interconnecting wire harnesses  
M-FS-22511 B73-10211 01

Low-resistivity homogeneous elastomers  
NPO-11881 B73-10349 04

Elastic light-scattering modulator: A concept  
M-FS-22724 B73-10422 03

High-temperature gas/liquid stress relaxometers  
NPO-13168 B73-10457 04

Apparatus for cutting elastomeric materials  
NPO-13146 B73-10521 07

**ELECTRIC BATTERIES**

Battery cell thermal-conductive coating increases efficiency  
LANGLEY-10963 B73-10237 01

Reliable low-cost battery voltage indicator for light aircraft and automobiles  
LEWIS-12020 B73-10249 01

**ELECTRIC CHOPPERS**

Impulse commutating circuit with transformer to limit reapplied voltage  
LEWIS-11849 B73-10004 01

**ELECTRIC CONNECTORS**

Flat conductor cable survey  
M-FS-22493 B73-10055 01

A proposed adjustable RF cable connector  
M-FS-24271 B73-10097 01

Electromagnetic connector  
JSC-17420 B73-10125 07

Flammability control for electrical cables and connectors  
M-FS-21584 B73-10235 02

Safe electrical receptacle and modified plug  
KSC-10817 B73-10366 01

Plug-in integrated/hybrid circuit  
M-FS-24470 B73-10476 01

RF shielded connectors  
GSFC-11215 B73-10509 01

**ELECTRIC CONTACTS**

Liquid metal porous matrix sliding electrical contact: A concept  
LEWIS-11735 B73-10164 01

**ELECTRIC CURRENT**

Probes for measuring noise current in an electronic cable  
NPO-13123 B73-10454 02

**ELECTRIC EQUIPMENT**

Electroshock protection circuit  
JSC-14222 B73-10261 02

**ELECTRIC FIELDS**

Suspension of objects in magnetic and electric fields  
JSC-14170 B73-10058 03

Measuring the electric field of a cloud  
KSC-10731 B73-10074 02

Rocket borne instrument to measure electric fields inside electrified clouds  
KSC-10730 B73-10176 03

- Determining distance to lightning strokes from a single station  
KSC-10698 B73-10178 02
- Ion masking improves resolution in quadrupole mass spectrometers  
GSFC-11406 B73-10181 03
- Elastic light-scattering modulator: A concept  
M-FS-22724 B73-10422 03
- ELECTRIC FILTERS**  
Carrier extraction circuit  
JSC-14262 B73-10094 02
- ELECTRIC MOTORS**  
An electric motor with magnetic bearings: A concept  
XGS-07805 B73-10304 01
- An electrochemical engine  
M-FS-22542 B73-10473 07
- ELECTRIC NETWORKS**  
A linear circuit analysis program with stiff systems capability  
LANGLEY-11184 B73-10091 09
- ELECTRIC OUTLETS**  
Safe electrical receptacle and modified plug  
KSC-10817 B73-10366 01
- ELECTRIC POWER**  
Proposed electromagnetic wave energy converter  
GSFC-11394 B73-10185 01
- An electrochemical engine  
M-FS-22542 B73-10473 07
- Solar-energy conversion system provides electrical power and thermal control for life-support systems  
M-FS-21628 B73-10524 06
- ELECTRIC POWER TRANSMISSION**  
Dynamic power load simulator  
JSC-14285 B73-10305 02
- Laser energy converted into electric power  
NPO-13308 B73-10353 02
- Probes for measuring noise current in an electronic cable  
NPO-13123 B73-10454 02
- ELECTRIC PROPULSION**  
An electrochemical engine  
M-FS-22542 B73-10473 07
- ELECTRIC SWITCHES**  
Synchro phase selector aid  
LANGLEY-11282 B73-10160 01
- Logic controlled solid state switchgear  
LEWIS-12044 B73-10408 02
- ELECTRIC TERMINALS**  
Flat conductor cable survey  
M-FS-22493 B73-10055 01
- ELECTRIC WELDING**  
Resistance spot welding of dispersion-strengthened nickel alloys  
LEWIS-12075 B73-10315 04
- ELECTRIC WIRE**  
Flammability control for electrical cables and connectors  
M-FS-21584 B73-10235 02
- Multilayer flat electrical cable  
ARC-10734 B73-10264 01
- ELECTRICAL FAULTS**  
Nomograph for prediction of RF-breakdown voltages  
NPO-11819 B73-10386 01
- Design method for minimizing RF voltage breakdown  
NPO-13408 B73-10520 01
- ELECTRICAL INSULATION**  
Multilayer flat electrical cable  
ARC-10734 B73-10264 01
- ELECTRICAL MEASUREMENT**  
Apparatus for measuring electrical properties of materials  
NPO-11749 B73-10025 03
- Measuring the electric field of a cloud  
KSC-10731 B73-10074 02
- Rocket borne instrument to measure electric fields inside electrified clouds  
KSC-10730 B73-10176 03
- ELECTRICAL PROPERTIES**  
Apparatus for measuring electrical properties of materials  
NPO-11749 B73-10025 03
- Silicon on sapphire for ion implantation studies  
LANGLEY-11415 B73-10522 04
- ELECTRICAL RESISTIVITY**  
Apparatus for measuring electrical properties of materials  
NPO-11749 B73-10025 03
- Low-resistivity homogeneous elastomers  
NPO-11881 B73-10349 04
- ELECTRO-OPTICS**  
Design and fabrication of an experimental image forming light modulator  
M-FS-22547 B73-10182 03
- Electro-optical device for monitoring wire size  
LANGLEY-11358 B73-10321 02
- ELECTROCARDIOGRAPHY**  
A new dry biomedical electrode  
JSC-14321 B73-10146 02
- Insulated ECG electrodes  
JSC-14339 B73-10220 05
- Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 B73-10236 02
- Vectorcardiogram  
JSC-14427 B73-10401 02
- ELECTROCHEMICAL CELLS**  
Rapid detection of bacteria in foods and biological fluids  
GSFC-11738 B73-10045 05
- Battery cell thermal-conductive coating increases efficiency  
LANGLEY-10963 B73-10237 01
- Corrugated battery electrode  
GSFC-11368 B73-10515 01
- Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 B73-10523 05
- ELECTROCHEMISTRY**  
An electrochemical engine  
M-FS-22542 B73-10473 07
- Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 B73-10523 05
- ELECTRODES**  
A new dry biomedical electrode  
JSC-14321 B73-10146 02
- Insulated ECG electrodes  
JSC-14339 B73-10220 05
- Corrugated battery electrode  
GSFC-11368 B73-10515 01
- Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- ELECTROENCEPHALOGRAPHY**  
Flexible electroencephalogram (EEG) headband  
LANGLEY-10927 B73-10048 05
- Eight-channel telephone telemetry system  
JSC-14452 B73-10320 05
- ELECTROLYSIS**  
Gas-operated actuator: A concept  
NPO-11369 B73-10133 03
- Catalytic reactor with disposable cartridge  
ARC-10747 B73-10378 04
- ELECTROLYTIC CELLS**  
Gas-operated actuator: A concept  
NPO-11369 B73-10133 03
- ELECTROMAGNETIC FIELDS**  
Ferrofluid separator for nonferrous scrap separation  
LANGLEY-11523 B73-10463 07
- ELECTROMAGNETIC INTERFERENCE**  
Probes for measuring noise current in an electronic cable  
NPO-13123 B73-10454 02
- ELECTROMAGNETIC NOISE**  
Sampling command generator corrects for noise and dropouts in recorded data  
NPO-11886 B73-10390 01
- ELECTROMAGNETIC PROPERTIES**  
Electromagnetic connector  
JSC-17420 B73-10125 07
- ELECTROMAGNETIC PUMPS**  
Magnetocaloric pump  
LEWIS-11672 B73-10124 07
- ELECTROMAGNETIC RADIATION**  
Proposed electromagnetic wave energy converter  
GSFC-11394 B73-10185 01
- Laser scanner for testing semiconductor chips  
M-FS-22693 B73-10327 02
- ELECTROMAGNETIC SHIELDING**  
RF shielded connectors  
GSFC-11215 B73-10509 01
- ELECTROMAGNETS**  
Ferrofluid separator for nonferrous scrap separation  
LANGLEY-11523 B73-10463 07
- ELECTROMECHANICAL DEVICES**  
Magnetic particle clutch controls servo system  
JSC-17136 B73-10041 06
- Master/slave manipulator system  
ARC-10756 B73-10496 06
- ELECTRON BEAM WELDING**  
Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03
- ELECTRON BEAMS**  
Design and fabrication of an experimental image forming light modulator  
M-FS-22547 B73-10182 03
- Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03
- ELECTRON DENSITY PROFILES**  
High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03
- ELECTRON DISTRIBUTION**  
High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03
- ELECTRON EMISSION**  
Design method for minimizing RF voltage breakdown  
NPO-13408 B73-10520 01
- ELECTRON TUBES**  
Event-sequence detector  
NPO-11703 B73-10278 01
- ELECTRONIC CONTROL**  
An automatic lightning detection and photographic system  
KSC-10728 B73-10043 02

**ELECTRONIC EQUIPMENT**

Oven temperature controller for electronic components  
 GSFC-11466 B73-10052 02

Positive contact resistance soldering unit  
 KSC-10242 B73-10145 02

Determining distance to lightning strokes from a single station  
 KSC-10698 B73-10178 02

Junction range finder  
 KSC-10108 B73-10191 02

Balloon-borne package temperature controller  
 GSFC-11620 B73-10192 03

Manufacture and quality control of interconnecting wire harnesses  
 M-FS-22511 B73-10211 01

A fault-tolerant clock  
 JSC-12531 B73-10218 09

Dynamic power load simulator  
 JSC-14285 B73-10305 02

Nomograph for prediction of RF-breakdown voltages  
 NPO-11819 B73-10386 01

Versatile electronic load  
 NPO-13202 B73-10458 03

Plug-in integrated/hybrid circuit  
 M-FS-24470 B73-10476 01

RF shielded connectors  
 GSFC-11215 B73-10509 01

**ELECTRONIC FILTERS**

Data-matched filter  
 JSC-14284 B73-10449 02

**ELECTRONIC PACKAGING**

A new packaging and testing concept for microelectronic components  
 M-FS-20936 B73-10109 01

Welded printed circuit (pc) stick  
 GSFC-11773 B73-10393 01

Hermetic-coaxial package design for microwave transistors  
 GSFC-10791 B73-10427 01

Nondestructive leak testing  
 LANGLEY-11561 B73-10464 08

New standoffs provide high-reliability component mounting for printed wiring boards  
 LANGLEY-11176 B73-10512 01

**ELECTRONICS**

Beam lead forming tool  
 M-FS-22133 B73-10098 07

**ELECTROPHORESIS**

Reproductive cell separation: A concept  
 M-FS-22627 B73-10198 05

Improved design of electrophoretic equipment for rapid sickle-cell-anemia screening  
 GSFC-11794 B73-10225 02

Zeta potential control for electrophoresis cells  
 M-FS-22333 B73-10260 04

Electrophoresis separator combining centrifugal separation  
 M-FS-21396 B73-10328 04

**ELECTROPLATING**

Selective coating for collecting solar energy on aluminum  
 M-FS-22562 B73-10527 04

**ELECTROSTATIC PROBES**

Mechanical positioning device for Langmuir probe  
 NPO-11626 B73-10034 06

**ELLIPSES**

Motion compensator for holographic motion picture camera  
 M-FS-22517 B73-10434 03

Photography of random motion with a holographic camera  
 M-FS-22537 B73-10435 03

**ELONGATION**

Variable load indicator  
 M-FS-21728 B73-10335 07

**EMBRITTLMENT**

Hydrogen-environment embrittlement of metals: A study  
 M-FS-22540 B73-10168 04

**EMISSION SPECTRA**

PPUAS-photopeak unfolding and self-shielding program  
 NPO-13188 B73-10087 09

**ENAMELS**

Refractory porcelain enamel passive-thermal-control coating for high-temperature superalloys  
 M-FS-22324 B73-10215 04

**ENCAPSULATING**

Glass encapsulation provides extra protection for IC semiconductor devices  
 M-FS-21310 B73-10054 01

Nonflammable potting-encapsulating and conformal coating compounds  
 JSC-14164 B73-10102 04

Silicon switching transistor with high power and low saturation voltage  
 NPO-11565 B73-10295 01

RF shielded connectors  
 GSFC-11215 B73-10509 01

**ENERGY ABSORPTION FILMS**

Applying high-emittance and solar-absorbance coating to aluminum  
 LANGLEY-10151 B73-10238 04

**ENERGY CONVERSION**

Proposed electromagnetic wave energy converter  
 GSFC-11394 B73-10185 01

Laser energy converted into electric power  
 NPO-13308 B73-10353 02

Solar-energy absorber: Active infrared (IR) trap  
 M-FS-22743 B73-10484 06

Solar-energy absorber: Active infrared (IR) trap without glass  
 M-FS-22744 B73-10485 06

Metal tube used as solar engine  
 ARC-10461 B73-10493 03

Solar-energy conversion system provides electrical power and thermal control for life-support systems  
 M-FS-21628 B73-10524 06

**ENERGY DISSIPATION**

Balsa wood as an energy dissipator  
 NPO-11839 B73-10388 04

**ENERGY STORAGE**

A practical solar energy heating and cooling system  
 M-FS-22563 B73-10156 05

Compact 20-kiloampere pulse-forming-network capacitor bank  
 LEWIS-12009 B73-10171 01

Monel-shot and screen regenerators  
 GSFC-11593 B73-10482 03

**ENERGY TRANSFER**

A practical solar energy heating and cooling system  
 M-FS-22563 B73-10156 05

**ENGINE DESIGN**

A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
 LEWIS-12011 B73-10245 09

Design handbook for gaseous fuel engine injectors and combustion chambers  
 LEWIS-12154 B73-10412 07

**ENGINE NOISE**

A theoretical study of aerodynamic noise generation  
 M-FS-24167 B73-10209 03

**ENGINES**

Metal tube used as solar engine  
 ARC-10461 B73-10493 03

**ENTROPY**

A theoretical study of aerodynamic noise generation  
 M-FS-24167 B73-10209 03

Analyses of unsteady entropic-flow processes  
 M-FS-24475 B73-10482 03

**ENVIRONMENTAL TESTS**

Evaluation of thermal insulation materials  
 NPO-11586 B73-10020 04

Effects of environmental exposure on cryogenic thermal insulation materials  
 LEWIS-12007 B73-10213 04

**EPITAXY**

Silicon on sapphire for ion implantation studies  
 LANGLEY-11415 B73-10522 04

**EPOXY RESINS**

Large boron-epoxy filament-wound pressure vessels  
 NPO-11900 B73-10038 08

Vacuum-strippable silicone binder for thermal-control paint  
 M-FS-21397 B73-10060 04

Production of circular polymer-glass fabric composites  
 M-FS-22125 B73-10069 04

A new concept for joining dissimilar composites  
 M-FS-24307 B73-10148 04

Battery cell thermal-conductive coating increases efficiency  
 LANGLEY-10963 B73-10237 01

Boron-epoxy tubular structure members  
 ARC-10737 B73-10265 08

Transparent polymeric laminates  
 ARC-10783 B73-10341 04

Manufacture of large, lightweight parabolic antennas  
 ARC-10741 B73-10375 08

Strain arrestor plate for mounting rigid insulating tiles  
 JSC-14182 B73-10465 06

**EQUATIONS OF MOTION**

A theoretical study of aerodynamic noise generation  
 M-FS-24167 B73-10209 03

Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
 JSC-14496 B73-10443 09

**EQUATIONS OF STATE**

An equation of state for oxygen and nitrogen  
 JSC-14465 B73-10394 04

**EQUIPMENT SPECIFICATIONS**

Measurement of dimensions and alignment with optical instruments  
 M-FS-22168 B73-10061 06

**ERROR ANALYSIS**

Validity test for linear error analysis  
JSC-14378 B73-10219 09

**ERROR CORRECTING DEVICES**

Digital servo controller behaves like synchro  
KSC-10769 B73-10337 02

**ERROR DETECTION CODES**

Minimal hardware, binary sequence pseudonoise generator and detector  
NPO-11406 B73-10292 01

Low-cost coding techniques for digital fault diagnosis  
NPO-11701 B73-10344 09

**ESCAPE SYSTEMS**

Emergency-escape device  
M-FS-22720 B73-10369 07

**ETHYLENE COMPOUNDS**

Moisture-resistant coatings for optical components  
ARC-10749 B73-10507 04

**ETHYLENEDIAMINETETRAACETIC ACIDS**

Oxygen sensitive paper  
M-FS-22354 B73-10103 04

Calibration of dissolved oxygen standard for analysis with methylene blue  
M-FS-22353 B73-10147 04

**EUTECTIC ALLOYS**

Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04

**EUTECTICS**

Eutectic bonding of sapphire to sapphire  
GSFC-11577 B73-10284 08

**EXHAUST GASES**

Air-atomizing splash-cone fuel nozzle reduces pollutant emissions from turbojet engines  
LEWIS-11918 B73-10200 06

Formaldehyde monitor for automobile exhausts  
LANGLEY-11352 B73-10228 04

Catalytic reactor with disposable cartridge  
ARC-10747 B73-10376 04

**EXHAUST SYSTEMS**

Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 B73-10471 03

**EXPLODING WIRES**

A high-speed spectrograph shutter  
HQ-10635 B73-10368 01

**EXPLORATION**

Articulated elastic-loop roving vehicles  
M-FS-22691 B73-10326 06

**EXPLOSIVE WELDING**

New explosive seam welding concepts  
LANGLEY-11211 B73-10180 04

**EXTRACTION**

Tool for installing or extracting small bulbs in limited-access spaces  
LANGLEY-11543 B73-10433 07

**EXTRATERRESTRIAL LIFE**

Unified life detection system: A concept  
ARC-10769 B73-10377 05

**EXTRATERRESTRIAL RADIATION**

Cosmic dust or other similar outer-space particles location detector  
GSFC-11291 B73-10282 02

**EXTREMELY LOW RADIO FREQUENCIES**

Pre-emphasis determination for an S-band constant bandwidth FM/FM station  
M-FS-22135 B73-10170 02

**EYE MOVEMENTS**

Eye-controlled "teletypewriter"  
LANGLEY-11564 B73-10514 02

**F**

**FABRICATION**

Large boron-epoxy filament-wound pressure vessels  
NPO-11900 B73-10038 08

Densification of powder metallurgy billets by a roll consolidation technique  
LEWIS-11395 B73-10040 08

Fabrication of magnetic bubble memory overlay  
M-FS-22377 B73-10096 01

Beam lead forming tool  
M-FS-22133 B73-10098 07

Fabrication techniques for polybenzimidazole composites  
ARC-10724 B73-10269 04

Silicon-fiber blanket solar-cell array concept  
M-FS-22458 B73-10374 01

Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04

Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04

Adhesive coating eliminated in new honeycomb-core fabrication process  
LANGLEY-11134 B73-10439 08

Process for the production of star-tracking reticles  
GSFC-11188 B73-10488 03

Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10516 03

**FABRICS**

A versatile flammability test chamber  
KSC-10126 B73-10111 06

**FACSIMILE COMMUNICATION**

Automatic focus control for facsimile camera  
LANGLEY-11213 B73-10361 02

**FAILURE**

Event-sequence detector  
NPO-11703 B73-10278 01

**FAILURE ANALYSIS**

An improved method for obtaining a normalized junction temperature for semiconductors: A concept  
JSC-14136 B73-10196 01

A new algorithm for finding survival coefficients employed in reliability equations  
M-FS-22295 B73-10256 09

Creep-fatigue analysis by Strainrange Partitioning  
LEWIS-12072 B73-10314 04

**FARADAY EFFECT**

Low-noise microwave polarimeter  
NPO-11512 B73-10134 02

**FAST NEUTRONS**

Fast-neutron spectrometer developments  
M-FS-22279 B73-10116 03

**FASTENERS**

Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04

**FATIGUE (MATERIALS)**

Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 B73-10079 04

A self-supporting strain transducer  
LANGLEY-11263 B73-10201 06

Creep-fatigue analysis by Strainrange Partitioning  
LEWIS-12072 B73-10314 04

**FATIGUE LIFE**

Carbide factor predicts rolling-element bearing fatigue life  
LEWIS-11940 B73-10008 07

**FATIGUE TESTS**

Fatigue testing device  
LANGLEY-10426 B73-10047 07

**FEEDBACK CIRCUITS**

Carrier extraction circuit  
JSC-14262 B73-10094 02

Integrable power gyrator  
M-FS-22342 B73-10159 02

**FEEDBACK CONTROL**

Digital slope-threshold data compressor  
NPO-11630 B73-10355 02

**FERRITES**

Digital data command bus  
NPO-11637 B73-10035 01

**FIBER STRENGTH**

Silicon-fiber blanket solar-cell array concept  
M-FS-22458 B73-10374 01

**FIBERS**

Fiber composite materials: A survey of fiber matrix interface mechanics  
LEWIS-11924 B73-10007 04

Technique for the polymerization of monomers for PPO/graphite fiber composites  
LEWIS-11879 B73-10014 04

Residual stress effects on the impact resistance and strength of fiber composites  
LEWIS-11984 B73-10063 04

A new concept for joining dissimilar composites  
M-FS-24307 B73-10148 04

Silicon-fiber blanket solar-cell array concept  
M-FS-22458 B73-10374 01

Procedure for dispersing fiber bundles  
LANGLEY-11224 B73-10438 08

Reusable silica surface-insulation material  
ARC-10721 B73-10504 04

**FIELD EFFECT TRANSISTORS**

Low phase-noise digital frequency divider  
NPO-11569 B73-10135 01

Gyrator circuit using field effect transistors  
M-FS-21433 B73-10161 02

P-channel silicone gate FET  
M-FS-22505 B73-10197 01

Integrated p-channel MOS gyrator  
M-FS-22343 B73-10217 02

Insulated ECG electrodes  
JSC-14339 B73-10220 05

Data multiplexer using a tree switch  
NPO-11333 B73-10289 02

**FILAMENT WINDING**

Large boron-epoxy filament-wound pressure vessels  
NPO-11900 B73-10038 08

- Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 873-10082 08
- FILTRATION**  
Industrial filter bags cleaned by high-frequency vibration: A concept  
M-FS-24445 873-10398 06  
Application of biological filters in water treatment systems  
JSC-14226 873-10404 05  
Backflushing system rapidly cleans fluid filters  
JSC-14273 873-10405 06  
Sequential-strip and sequential-disk filters  
JSC-14592 873-10430 06
- FINITE DIFFERENCE THEORY**  
Computer program for predicting symmetric jet mixing of compressible flow in jets  
AHC-10730 873-10263 09
- FIRE CONTROL**  
Detector for inspection of fire alarms  
GSFC-11600 873-10128 06
- FIRE PREVENTION**  
A versatile flammability test chamber  
KSC-10126 873-10111 06
- FIREPROOFING**  
Fire retardant cellulosic foam  
JSC-14336 873-10085 04  
Flammability control for electrical cables and connectors  
M-FS-21584 873-10235 02
- FIRES**  
Emergency-escape device  
M-FS-22720 873-10369 07
- FITTINGS**  
Improved fiberglass-to-metal joint produces lighter stronger fiberglass strut  
LEWIS-11661 873-10258 08
- FLAMMABILITY**  
A versatile flammability test chamber  
KSC-10126 873-10111 06
- FLAPS (CONTROL SURFACES)**  
Flex flap  
ARC-10771 873-10502 06
- FLAT CONDUCTORS**  
Flat conductor cable survey  
M-FS-22493 873-10055 01
- FLAT PLATES**  
Diffusion welding tool  
LEWIS-11807 873-10072 08
- FLAT SURFACES**  
Improved technique for inspection of planar surfaces by microscopy and interferometry  
NPO-11893 873-10143 03
- FLEXIBLE BODIES**  
Embossed metal diaphragm has two-way stretch  
NPO-11635 873-10298 08  
Hybrid coordinate formulation used for the design of attitude control systems for flexible spacecraft  
NPO-11714 873-10300 09
- FLIGHT MECHANICS**  
Ascent control analysis for S-II derivative launch vehicles, digital computer program  
M-FS-24324 873-10120 09
- FLIP-FLOPS**  
Time-based priority selection for analog circuits  
M-FS-24242 873-10154 02  
Digital random-number generator  
ARC-10096 873-10266 09  
Digital servo controller behaves like synchro  
KSC-10769 873-10337 02
- Frequency control circuit for all-digital phase-lock loops  
NPO-11936 873-10351 01
- FLOATS**  
Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 873-10190 07
- FLOW CHARACTERISTICS**  
Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 873-10233 09
- FLOW DISTRIBUTION**  
Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
LANGLEY-11250 873-10183 06  
Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
LANGLEY-11249 873-10184 06
- FLOW MEASUREMENT**  
Ion-tracer anemometer  
M-FS-21399 873-10151 04  
Laser velocimeter with transverse and on-axis sensitivity  
ARC-10842 873-10262 03
- FLOW VELOCITY**  
Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 873-10267 02
- FLOWMETERS**  
Particle-fluid interactions for flow measurements  
M-FS-21727 873-10117 06
- FLUID DYNAMICS**  
Computer program for predicting symmetric jet mixing of compressible flow in jets  
ARC-10730 873-10263 09  
Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 873-10307 09  
Improved syncom-type fluid damper  
GSFC-11205 873-10478 06  
Analyses of unsteady entropic-flow processes  
M-FS-24475 873-10482 03
- FLUID FILTERS**  
Backflushing system rapidly cleans fluid filters  
JSC-14273 873-10405 06  
Sequential-strip and sequential-disk filters  
JSC-14592 873-10430 06
- FLUID FLOW**  
Bimetallic devices for stirring fluids  
ARC-10441 873-10029 06  
Geysering inhibitor pipe  
KSC-10615 873-10110 07  
Particle-fluid interactions for flow measurements  
M-FS-21727 873-10117 06  
Pressure drop and pumping power for fluid flow through round tubes  
M-FS-24172 873-10186 09  
Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 873-10417 03
- FLUIDS**  
Long-term material compatibility testing system  
NPO-11776 873-10385 04
- FLUORESCENCE**  
Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 873-10027 03
- Rocket plume properties measured in space simulators  
NPO-11608 873-10137 03  
Dye laser remote sensing of marine plankton  
LANGLEY-11382 873-10359 05
- FLUORO COMPOUNDS**  
Nonflammable potting-encapsulating and conformal coating compounds  
JSC-14164 873-10102 04  
Flammability control for electrical cables and connectors  
M-FS-21584 873-10235 02
- FLUOROCARBONS**  
A new intermediate for the production of flexible stable polymers  
M-FS-22355 873-10080 04  
Manufacture and quality control of interconnecting wire harnesses  
M-FS-22511 873-10211 01
- FOAMS**  
Fire retardant cellulosic foam  
JSC-14336 873-10085 04
- FOCUSING**  
Automatic focus control for facsimile camera  
LANGLEY-11213 873-10361 02
- FOOD**  
Rapid detection of bacteria in foods and biological fluids  
GSFC-11738 873-10046 05
- FORCED VIBRATION**  
Mechanical impedance and acoustic mobility measurement techniques of specifying vibration environments  
M-FS-22016 873-10059 06
- FORMALDEHYDE**  
Self-sterilizing polymers  
M-FS-22054 873-10090 04  
Formaldehyde monitor for automobile exhausts  
LANGLEY-11352 873-10228 04
- FORMING TECHNIQUES**  
Autoclave heat treatment for prealloyed powder products  
LEWIS-11953 873-10172 04
- FORTRAN**  
N-body U and K matrix program  
LEWIS-11438 873-10012 09  
A comprehensive program for textual concordances and statistics  
JSC-17484 873-10049 09  
Computer program for transient response of structural rings subjected to fragment impact  
LEWIS-11926 873-10064 09  
Aerotherm charring materials ablation computer program  
LEWIS-11854 873-10065 09  
Computer program for preliminary design analysis of axial-flow turbines  
LEWIS-11815 873-10066 09  
Medical information management system (MIMS): An automated hospital information system  
GSFC-11540 873-10073 09  
PPUAS--photopeak unfolding and self-shielding program  
NPO-13188 873-10087 09  
A general purpose maneuver turns computer program  
NPO-13213 873-10088 09  
A linear circuit analysis program with stiff systems capability  
LANGLEY-11184 873-10091 09

- Eigenvalue routine by Sturm sequence method  
NPO-11805 873-10114 09
- Automated shell theory for rotating structures (ASTROS)  
M-FS-21970 873-10115 09
- Ascent control analysis for S-II derivative launch vehicles, digital computer program  
M-FS-24324 873-10120 09
- GREMEX update (Goddard research engineering management exercise)  
GSFC-11512 873-10162 09
- Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
LANGLEY-11250 873-10183 06
- Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
LANGLEY-11249 873-10184 06
- Computer program for the design of toroidal transformers  
LEWIS-11878 873-10214 09
- Spectral analysis program (SAP)  
JSC-14310 873-10227 09
- Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
LEWIS-11997 873-10231 09
- A computer program for calculating design and off-design performance for turbojet and turbofan engines  
LEWIS-12010 873-10232 09
- Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 873-10233 09
- Method for predicting rotor free-wake positions and the resulting rotor blade airloads  
LANGLEY-10674 873-10239 06
- Computer program to determine roots of polynomials by ratio of successive derivatives  
LEWIS-11809 873-10244 09
- A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
LEWIS-12011 873-10245 09
- Computer program for compressible flow network analysis  
LEWIS-11859 873-10246 09
- Computer program to compute buckling loads of simply supported anisotropic plates  
LEWIS-11961 873-10247 09
- Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
LEWIS-11996 873-10248 09
- Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 873-10307 09
- Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
LEWIS-12008 873-10309 09
- Characteristics of FORTRAN  
LANGLEY-11177 873-10322 09
- Computer program to determine pressure distributions and forces on blunt bodies of revolution  
LANGLEY-11197 873-10362 09
- Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 873-10363 09
- Marshall system for aerospace simulation (MARSYAS)  
M-FS-22672 873-10432 09
- Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
JSC-14496 873-10443 09
- Frequencies and modes for shells of revolution (FAMSOR)  
JSC-14497 873-10444 09
- The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 873-10445 09
- Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
JSC-14494 873-10446 09
- Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
LANGLEY-11305 873-10470 06
- Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 873-10471 03
- Stereoscopic computer graphics display system  
M-FS-22322 873-10526 09
- FOURIER TRANSFORMATION**
- Computer-controlled vibration testing  
NPO-11812 873-10138 02
- Design and fabrication of an experimental image forming light modulator  
M-FS-22547 873-10182 03
- FRACTURE MECHANICS**
- Fiber composite materials: A survey of fiber matrix interface mechanics  
LEWIS-11924 873-10007 04
- Optimization of structures on the basis of fracture mechanics and reliability criteria  
NPO-11645 873-10276 06
- Design guide for glass fiber reinforced metal pressure vessel  
LEWIS-12042 873-10311 08
- FRACTURE STRENGTH**
- Probability of stress-corrosion fracture under random loading  
NPO-13113 873-10453 04
- FREEZING**
- Fluid insulation to prevent ice formation in heat exchangers  
LEWIS-11959 873-10028 06
- Preservation of flavor in freeze dried green beans  
JSC-14149 873-10092 05
- Automatic device for shell freezing of liquids  
GSFC-11737 873-10253 04
- FREQUENCY CONTROL**
- Digital notch filter  
KSC-10182 873-10112 02
- Frequency control circuit for all-digital phase-lock loops  
NPO-11936 873-10351 01
- FREQUENCY CONVERTERS**
- RF to digital converter  
JSC-14419 873-10306 02
- FREQUENCY DIVIDERS**
- Low phase-noise digital frequency divider  
NPO-11569 873-10135 01
- FREQUENCY DIVISION MULTIPLEXING**
- Synchronous ten-megabit biphasic detector  
M-FS-22546 873-10323 02
- FREQUENCY MODULATION**
- Pre-emphasis determination for an S-band constant bandwidth FM/FM station  
M-FS-22135 873-10170 02
- Junction range finder  
KSC-10108 873-10191 02
- High-sensitivity receiver for CO2 laser communications  
GSFC-11455 873-10223 02
- Spectral analysis program (SAP)  
JSC-14310 873-10227 09
- RF to digital converter  
JSC-14419 873-10306 02
- Carrier suppression device for a heterodyne gas analyzer  
ARC-10785 873-10381 03
- FREQUENCY SCANNING**
- Automatic carrier acquisition system for phase-lock-loop receivers  
NPO-11628 873-10343 02
- FREQUENCY SHIFT**
- Real time optical figure sensor  
M-FS-22123 873-10169 02
- Frequency shifting with a solid-state switching capacitor  
HQ-10812 873-10259 01
- Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 873-10262 03
- Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 873-10267 02
- Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 873-10371 04
- Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 873-10417 03
- Motion compensator for holographic motion picture camera  
M-FS-22517 873-10434 03
- FREQUENCY STABILITY**
- A technique to eliminate false lock in PCM demodulation  
JSC-12494 873-10106 02
- Phase shift keyed, pulse code modulated signal synchronizer  
JSC-12462 873-10107 02
- Stabilizing a gaseous optical laser  
XGS-03644 873-10517 03
- FREQUENCY STANDARDS**
- Time-synchronized VLF phase-tracking receiver  
NPO-11600 873-10275 02
- Stabilizing a gaseous optical laser  
XGS-03644 873-10517 03
- FREQUENCY SYNCHRONIZATION**
- A technique to eliminate false lock in PCM demodulation  
JSC-12494 873-10106 02
- Phase shift keyed, pulse code modulated signal synchronizer  
JSC-12462 873-10107 02
- FUEL CELLS**
- A methanol/air fuel cell system  
M-FS-22541 873-10472 07
- An electrochemical engine  
M-FS-22542 873-10473 07
- Vapor-deposited platinum as a fuel-cell catalyst  
M-FS-21317 873-10475 04
- Fuel-cell heat and mass plate  
M-FS-21318 873-10489 07

**FUEL INJECTION**

Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07  
Injector has no backslash  
NPO-13208 B73-10461 07

**FUEL OILS**

Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 B73-10190 07

**FUEL SPRAYS**

Injector has no backslash  
NPO-13208 B73-10461 07

**FUEL TANKS**

Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08

**FUNCTION GENERATORS**

Logical-function generator  
XLA-05099 B73-10360 09

**FUSION WELDING**

Resistance spot welding of dispersion-strengthened nickel alloys  
LEWIS-12075 B73-10315 04

**G****GALLIUM ARSENIDES**

GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 B73-10442 01

**GALLIUM COMPOUNDS**

Vapor phase growth of group 3, 4, and 5 compounds by HCl transport of elements  
LANGLEY-11144 B73-10056 04

**GAMMA RAYS**

Reductive cleavage of the peptide bond  
LRL-10026 B73-10194 04  
Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06

**GARNETS**

Fabrication of magnetic bubble memory overlay  
M-FS-22377 B73-10096 01

**GAS ANALYSIS**

Unified life detection system: A concept  
ARC-10769 B73-10377 05  
Carrier suppression device for a heterodyne gas analyzer  
ARC-10785 B73-10381 03

**GAS BEARINGS**

Poppet valve tester  
LEWIS-11655 B73-10415 07  
Linear kinematic air bearing  
NPO-13151 B73-10456 06

**GAS CHROMATOGRAPHY**

Magnetic latching valve  
NPO-11790 B73-10026 06  
Calibration of dissolved oxygen standard for analysis with methylene blue  
M-FS-22353 B73-10147 04  
Dynamic technique for measuring adsorption in a gas chromatograph  
JSC-14083 B73-10339 04  
Gas chromatography of volatile organic compounds  
JSC-14428 B73-10406 04  
Soil moisture by extraction and gas chromatography  
ARC-10748 B73-10503 04

**GAS DETECTORS**

Detection of nitric oxide pollution  
ARC-10709 B73-10018 03

**GAS DYNAMICS**

Analyses of unsteady entropic-flow processes  
M-FS-24475 B73-10482 03

**GAS FLOW**

Particle-fluid interactions for flow measurements  
M-FS-21727 B73-10117 06  
Ion-tracer anemometer  
M-FS-21399 B73-10151 04  
Mass flow controller for gaseous propellants  
JSC-14221 B73-10207 08  
Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 B73-10371 04  
High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03

**GAS GENERATORS**

Smoke generator  
LANGLEY-11433 B73-10414 06

**GAS GUNS**

Collapsible pistons for light-gas guns  
JSC-13789 B73-10413 07

**GAS INJECTION**

Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07

**GAS IONIZATION**

Design method for minimizing RF voltage breakdown  
NPO-13408 B73-10520 01

**GAS LASERS**

Stabilizing a gaseous optical laser  
XGS-03644 B73-10517 03

**GAS MIXTURES**

Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 B73-10230 06

**GAS PRESSURE**

Measuring micro-organism gas production  
LANGLEY-11326 B73-10241 05

**GAS TRANSPORT**

Vapor phase growth of group 3, 4, and 5 compounds by HCl transport of elements  
LANGLEY-11144 B73-10056 04  
Transfer of gaseous oxygen from high-pressure containers and the Joule-Thomson inversion  
KSC-10721 B73-10483 04

**GAS TUNGSTEN ARC WELDING**

Welding high-strength aluminum alloys  
M-FS-22918 B73-10481 04

**GAS TURBINE ENGINES**

Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08

**GAS TURBINES**

A flexible cruciform journal bearing mount  
LEWIS-11035 B73-10001 07

**GAS-LIQUID INTERACTIONS**

Separation of gas from liquid in a two-phase flow system  
NPO-11556 B73-10383 03

**GAS-METAL INTERACTIONS**

Long-term material compatibility testing system  
NPO-11776 B73-10385 04

**GASEOUS ROCKET PROPELLANTS**

Mass flow controller for gaseous propellants  
JSC-14221 B73-10207 06

**GASOLINE**

Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 B73-10190 07

**GATES (CIRCUITS)**

P-channel silicon gate FET  
M-FS-22505 B73-10197 01  
Frequency control circuit for all-digital phase-lock loops  
NPO-11936 B73-10351 01  
Pulse stretcher for narrow pulses  
JSC-14130 B73-10365 02  
Gated compressor, distortionless signal limiter  
NPO-11820 B73-10387 01  
Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
NPO-13051 B73-10460 02

**GE COMPUTERS**

Automated data management information system (ADMIS)  
KSC-10819 B73-10053 09

**GEARS**

Mechanical planetary compensating drive system  
ARC-10462 B73-10497 06

**GENETICS**

Reproductive cell separation: A concept  
M-FS-22627 B73-10198 05

**GETTERS**

Gettering capsule for removing oxygen from liquid lithium systems  
LEWIS-11509 B73-10002 04

**GLASS**

Glass transition temperatures of liquid prepolymers obtained by thermal penrometry  
NPO-11730 B73-10036 04  
Solar-energy absorber: Active infrared (IR) trap  
M-FS-22743 B73-10484 06

**GLASS COATINGS**

Glass encapsulation provides extra protection for IC semiconductor devices  
M-FS-21310 B73-10054 01  
Improved mold release for filled-silicone compounds  
JSC-19300 B73-10338 04

**GLASS FIBERS**

Evaluation of thermal insulation materials  
NPO-11586 B73-10020 04  
Production of circular polymer-glass fabric composites  
M-FS-22125 B73-10069 04  
Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08  
Lightweight graphite/polyimide panels  
JSC-14375 B73-10121 04  
Manufacture and quality control of interconnecting wire harnesses  
M-FS-22511 B73-10211 01  
Effects of environmental exposure on cryogenic thermal insulation materials  
LEWIS-12007 B73-10213 04  
Improved fiberglass-to-metal joint produces lighter stronger fiberglass strut  
LEWIS-11661 B73-10258 08

- Design guide for glass fiber reinforced metal pressure vessel  
LEWIS-12042 B73-10311 08
- Adhesive coating eliminated in new honeycomb-core fabrication process  
LANGLEY-11134 B73-10439 08
- Reusable silica surface-insulation material  
ARC-10721 B73-10504 04
- Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04
- GOLD**  
Low-closing-force seal  
ARC-10775 B73-10380 06
- GOLD ALLOYS**  
Stable palladium alloys for diffusion of hydrogen  
NPO-11747 B73-10024 04
- GRAPHITE**  
Technique for the polymerization of monomers for PPQ/graphite fiber composites  
LEWIS-11879 B73-10014 04
- Preparation of prepreg graphite tape with insoluble polymer  
JSC-14313 B73-10084 04
- Lightweight graphite/polyimide panels  
JSC-14375 B73-10121 04
- Graphite/polyimide laminates with near-zero thermal expansion  
JSC-17662 B73-10254 04
- Strain arrestor plate for mounting rigid insulating tiles  
JSC-14182 B73-10465 06
- GRATINGS (SPECTRA)**  
Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10516 03
- GREASES**  
Lubrication handbook  
M-FS-22326 B73-10062 04
- GRINDING MACHINES**  
Biodetection grinder  
M-FS-22833 B73-10474 05
- GUIDANCE (MOTION)**  
Fine guidance for a spaceborne telescope  
GSFC-11487 B73-10468 03
- GYRATORS**  
Integrable power gyrator  
M-FS-22342 B73-10159 02
- Gyrator circuit using field effect transistors  
M-FS-21433 B73-10161 02
- Integrated p-channel MOS gyrator  
M-FS-22343 B73-10217 02
- H**
- HABITABILITY**  
Shuttle orbiter storage locker system: A study  
JSC-14448 B73-10287 08
- HALL GENERATORS**  
Solid-state controller  
JSC-12394 B73-10466 06
- HANDBOOKS**  
Flat conductor cable survey  
M-FS-22493 B73-10055 01
- Lubrication handbook  
M-FS-22326 B73-10062 04
- Handbook on thermophysical properties of oxygen  
LEWIS-11962 B73-10187 04
- Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
LEWIS-11963 B73-10188 04
- Effects of environmental exposure on cryogenic thermal insulation materials  
LEWIS-12007 B73-10213 04
- Design guide for glass fiber reinforced metal pressure vessel  
LEWIS-12042 B73-10311 08
- Materials data handbook on titanium 6Al-4V  
M-FS-22796 B73-10372 04
- Materials data handbooks on aluminum alloys  
M-FS-22798 B73-10373 04
- Isogrid design handbook  
M-FS-22686 B73-10395 06
- Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04
- Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04
- Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07
- Design parameters for toroidal and bobbin magnetics  
NPO-13441 B73-10459 01
- Welding high-strength aluminum alloys  
M-FS-22918 B73-10481 04
- Stereoscopic computer graphics display system  
M-FS-22322 B73-10526 09
- HARDWARE**  
Flat conductor cable survey  
M-FS-22493 B73-10055 01
- HARMONICS**  
Extended range harmonic filter  
LEWIS-12064 B73-10313 02
- Combined diplexer and harmonic filter  
LEWIS-12059 B73-10410 02
- HARNESSES**  
Manufacture and quality control of interconnecting wire harnesses  
M-FS-22511 B73-10211 01
- Plug-in integrated/hybrid circuit  
M-FS-24470 B73-10476 01
- HAZARDS**  
Safe electrical receptacle and modified plug  
KSC-10817 B73-10366 01
- HEART RATE**  
Vectorcardiogram  
JSC-14427 B73-10401 02
- Cardiotachometer displays heart rate on a beat-to-beat basis  
M-FS-20284 B73-10477 05
- HEAT**  
Recovery of recordings from heat damaged magnetic tapes  
JSC-14219 B73-10173 02
- HEAT EXCHANGERS**  
Fluid insulation to prevent ice formation in heat exchangers  
LEWIS-11959 B73-10028 06
- Condensate-removal device for heat exchangers  
JSC-14143 B73-10429 06
- Monel-shot and screen regenerators  
GSFC-11593 B73-10462 03
- Solar-energy conversion system provides electrical power and thermal control for life-support systems  
M-FS-21628 B73-10524 06
- HEAT FLUX**  
Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07
- HEAT MEASUREMENT**  
Thermally responsive mechanical actuator  
GSFC-11697 B73-10208 04
- A heat flow calorimeter  
GSFC-11434 B73-10221 03
- HEAT OF VAPORIZATION**  
Fuel-cell heat and mass plate  
M-FS-21318 B73-10489 07
- HEAT PIPES**  
Structural heat pipe  
GSFC-11619 B73-10364 06
- Fuel-cell heat and mass plate  
M-FS-21318 B73-10489 07
- HEAT PUMPS**  
Bimetallic devices for stirring fluids  
ARC-10441 B73-10029 06
- HEAT RESISTANT ALLOYS**  
Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08
- Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08
- Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04
- Braze alloys for high temperature service  
LEWIS-11374 B73-10205 06
- Refractory porcelain enamel passive-thermal-control coating for high-temperature superalloys  
M-FS-22324 B73-10215 04
- Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04
- HEAT SHIELDING**  
Fabrication techniques for polybenzimidazole composites  
ARC-10724 B73-10269 04
- HEAT SOURCES**  
Low cost uniform heat source  
LEWIS-11903 B73-10011 02
- Detector for inspection of fire alarms  
GSFC-11600 B73-10128 08
- New method for determining thermophysical properties of test specimens  
LANGLEY-11053 B73-10447 04
- HEAT TRANSFER**  
Aerotherm charring materials ablation computer program  
LEWIS-11854 B73-10065 09
- Thermal-dynamic modeling study  
LANGLEY-11309 B73-10076 06
- Thin film thermoelectric devices as thermal control coatings: A study  
M-FS-21384 B73-10153 04
- Handbook on thermophysical properties of oxygen  
LEWIS-11962 B73-10187 04
- Solar-energy absorber: Active infrared (IR) trap  
M-FS-22743 B73-10484 06
- Solar-energy absorber: Active infrared (IR) trap without glass  
M-FS-22744 B73-10485 06
- HEAT TRANSMISSION**  
A heat flow calorimeter  
GSFC-11434 B73-10221 03

**HEAT TREATMENT**

Autoclave heat treatment for prealloyed powder products  
LEWIS-11953 B73-10172 04

**HELICOPTER DESIGN**

Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 B73-10471 03

**HELIUM**

SRC seal testing  
M-FS-22426 B73-10199 01

**HELIUM-NEON LASERS**

Laser addressed holographic memory system  
M-FS-22565 B73-10155 03

**HEMOGLOBIN**

Improved design of electrophoretic equipment for rapid sickle-cell-anemia screening  
GSFC-11794 B73-10225 02

**HEMOLYSIS**

Improved design of electrophoretic equipment for rapid sickle-cell-anemia screening  
GSFC-11794 B73-10225 02

**HERMETIC SEALS**

SRC seal testing  
M-FS-22426 B73-10199 01  
Nondestructive leak testing  
LANGLEY-11561 B73-10464 06

**HETERODYNING**

High-sensitivity receiver for CO<sub>2</sub> laser communications  
GSFC-11455 B73-10223 02  
Carrier suppression device for a heterodyne gas analyzer  
ARC-10785 B73-10381 03

**HEWLETT-PACKARD COMPUTERS**

Pressure drop and pumping power for fluid flow through round tubes  
M-FS-24172 B73-10186 09

**HEXAGONS**

Embossed metal diaphragm has two-way stretch  
NPO-11635 B73-10298 08

**HIGH ALTITUDE BALLOONS**

Balloon-borne package temperature controller  
GSFC-11620 B73-10192 03

**HIGH FREQUENCIES**

Industrial filter bags cleaned by high-frequency vibration: A concept  
M-FS-24445 B73-10398 06

**HIGH PRESSURE OXYGEN**

Transfer of gaseous oxygen from high-pressure containers and the Joule-Thomson inversion  
KSC-10721 B73-10483 04

**HIGH SPEED CAMERAS**

A real time moving-scene holographic camera  
M-FS-21087 B73-10421 03

**HIGH STRENGTH ALLOYS**

Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08

**HIGH TEMPERATURE RESEARCH**

A flexible all-temperature pressure vessel  
M-FS-19196 B73-10158 03

**HIGH TEMPERATURE TESTS**

High-temperature-radiation analyzer  
ARC-10585 B73-10017 03

**HOLOGRAPHY**

Vibration measurement by pulse differential holographic interferometry  
LANGLEY-11092 B73-10075 03

Holographic testing with a double reference beam  
JSC-17959 B73-10086 03

A generalized approach to computer synthesis of digital holograms  
M-FS-21973 B73-10101 09

Holographic nondestructive testing of laminates  
JSC-19107 B73-10108 04

Laser addressed holographic memory system  
M-FS-22565 B73-10155 03

An improved holographic recording medium  
M-FS-22532 B73-10166 09

Bonded panel, flaw detection standards  
LANGLEY-11399 B73-10240 06

Hologram recording tubes  
M-FS-22590 B73-10330 03

Coherence-length extender  
M-FS-22434 B73-10399 03

A real time moving-scene holographic camera  
M-FS-21087 B73-10421 03

Laser-actuated holographic storage device  
M-FS-22768 B73-10423 03

Motion compensator for holographic motion picture camera  
M-FS-22517 B73-10434 03

Photography of random motion with a holographic camera  
M-FS-22537 B73-10435 03

**HOMOGENEITY**

Low-resistivity homogeneous elastomers  
NPO-11881 B73-10349 04

**HONEYCOMB CORES**

Radial honeycomb core  
ARC-10727 B73-10340 08

Adhesive coating eliminated in new honeycomb-core fabrication process  
LANGLEY-11134 B73-10439 08

**HONEYCOMB STRUCTURES**

Lightweight, graphite/polyimide panels  
JSC-14375 B73-10121 04

New concept in brazing metallic honeycomb panels  
LANGLEY-10957 B73-10358 08

Corrugated battery electrode  
GSFC-11368 B73-10515 01

Honeycomb battery plaque  
GSFC-11367 B73-10519 01

**HOSPITALS**

Intensive care alarm system  
GSFC-11377 B73-10126 02

New system for bathing bedridden patients  
ARC-10745 B73-10272 05

Vectorcardiogram  
JSC-14427 B73-10401 02

**HOT PRESSING**

Improved diffusion welding and roll welding of titanium alloys  
LEWIS-11852 B73-10005 08

**HUMAN BODY**

Mathematical model for predicting human vertebral fracture  
ARC-10691 B73-10033 05

**HUMAN FACTORS ENGINEERING**

Integral aircraft passenger seat  
ARC-10799 B73-10495 05

**HUMAN REACTIONS**

System for measuring passenger reaction to transportation-vehicle vibration  
LANGLEY-11353 B73-10436 05

**HUMIDITY**

A new method for the determination of thin film porosity  
HQ-10673 B73-10286 01

**HUMIDITY MEASUREMENT**

Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 B73-10230 06

**HYDRAULIC EQUIPMENT**

Fail-safe bidirectional valve driver  
NPO-11958 B73-10450 07

**HYDRAULIC FLUIDS**

Lubrication handbook  
M-FS-22326 B73-10062 04

**HYDRAZINES**

Rubber composition compatible with hydrazine  
NPO-11440 B73-10019 04

**HYDROCARBONS**

Method for estimating solubility parameter  
NPO-11647 B73-10022 04

An improved holographic recording medium  
M-FS-22532 B73-10166 09

**HYDROGEN**

Stable palladium alloys for diffusion of hydrogen  
NPO-11747 B73-10024 04

Gas-operated actuator: A concept  
NPO-11369 B73-10133 03

Hydrogen-environment embrittlement of metals: A study  
M-FS-22540 B73-10168 04

Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 B73-10230 06

Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 B73-10523 05

**HYPERVELOCITY PROJECTILES**

Collapsible pistons for light-gas guns  
JSC-13789 B73-10413 07

**IBM 360 COMPUTER**

A comprehensive program for textual concordances and statistics  
JSC-17484 B73-10049 09

Ascent control analysis for S-II derivative launch vehicles, digital computer program  
M-FS-24324 B73-10120 09

GREMEX update (Goddard research engineering management exercise)  
GSFC-11512 B73-10162 09

Method for predicting rotor free-wake positions and the resulting rotor blade airloads  
LANGLEY-10674 B73-10239 06

Computer program to determine roots of polynomials by ratio of successive derivatives  
LEWIS-11809 B73-10244 09

Characteristics of FORTRAN  
LANGLEY-11177 B73-10322 09

Logistics hardware and services control system  
KSC-10819 B73-10418 09

- Dynamic nonlinear analysis of shells of revolution. (DYNASOR II)  
 JSC-14496 873-10443 09
- Frequencies and modes for shells of revolution (FAMSOR)  
 JSC-14497 873-10444 09
- The static nonlinear analysis of shells of revolution (SNASOR II)  
 JSC-14495 873-10445 09
- Stiffness and mass matrices for shells of revolution (SAMSOR II)  
 JSC-14494 873-10446 09
- IBM 7090 COMPUTER**
- Aerotherm charring materials ablation computer program  
 LEWIS-11854 873-10065 09
- Computer program for preliminary design analysis of axial-flow turbines  
 LEWIS-11815 873-10066 09
- IBM 7094 COMPUTER**
- Aerotherm charring materials ablation computer program  
 LEWIS-11854 873-10065 09
- Computer program for preliminary design analysis of axial-flow turbines  
 LEWIS-11815 873-10066 09
- Automated shell theory for rotating structures (ASTROS)  
 M-FS-21970 873-10115 09
- GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512 873-10162 09
- Computer program for the design of toroidal transformers  
 LEWIS-11878 873-10214 09
- Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
 LEWIS-11997 873-10231 09
- A computer program for calculating design and off-design performance for turbojet and turbofan engines  
 LEWIS-12010 873-10232 09
- Computer program to determine roots of polynomials by ratio of successive derivatives  
 LEWIS-11809 873-10244 09
- A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
 LEWIS-12011 873-10245 09
- Computer program for compressible flow network analysis  
 LEWIS-11859 873-10246 09
- Computer program to compute buckling loads of simply supported anisotropic plates  
 LEWIS-11961 873-10247 09
- Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
 LEWIS-11996 873-10248 09
- Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
 LEWIS-12008 873-10309 09
- ICE FORMATION**
- Fluid insulation to prevent ice formation in heat exchangers  
 LEWIS-11959 873-10028 06
- IGNITION TEMPERATURE**
- Autoignition test cell with flexible atmosphere control  
 KSC-10198 873-10113 04
- IMAGE CONVERTERS**
- A magnetically focused image tube employing an opaque photocathode  
 GSFC-11602 873-10255 02
- IMAGE DISSECTOR TUBES**
- Light-direction sensor based on birefringency  
 NPO-11201 873-10131 03
- IMAGE ENHANCEMENT**
- Video enhancement of X-ray and neutron radiographs  
 LEWIS-11944 873-10009 03
- Digital TV image enhancement system  
 GSFC-11256 873-10285 02
- IMAGE MOTION COMPENSATION**
- Motion compensator for holographic motion picture camera  
 M-FS-22517 873-10434 03
- IMAGE TUBES**
- A magnetically focused image tube employing an opaque photocathode  
 GSFC-11602 873-10255 02
- IMAGERY**
- Image formation in microwave holography  
 ARC-10773 873-10378 03
- IMAGING TECHNIQUES**
- Design and fabrication of an experimental image forming light modulator  
 M-FS-22547 873-10182 03
- Microwave holography for nondestructive testing  
 ARC-10774 873-10379 03
- IMPACT RESISTANCE**
- Residual stress effects on the impact resistance and strength of fiber composites  
 LEWIS-11984 873-10063 04
- Computer program for transient response of structural rings subjected to fragment impact  
 LEWIS-11926 873-10064 09
- IMPEDANCE MATCHING**
- A proposed adjustable RF cable connector  
 M-FS-24271 873-10097 01
- A vacuum chamber feedthrough  
 M-FS-21133 873-10152 01
- IMPLANTATION**
- GaAs transistors formed by Be or Mg ion implantation  
 LANGLEY-11204 873-10442 01
- IMPULSES**
- Dynamic testing of complex structures  
 JSC-12569 873-10057 06
- INCENTIVES**
- Motivation techniques for supervision  
 JSC-19187 873-10448 05
- INCOMPRESSIBLE FLOW**
- Computer program for the prediction of reorientation flow dynamics  
 LEWIS-11816 873-10307 09
- INCONEL (TRADEMARK)**
- Materials data handbook on Inconel Alloy 718  
 M-FS-22793 873-10396 04
- INDEXES (DOCUMENTATION)**
- A comprehensive program for textual concordances and statistics  
 JSC-17484 873-10049 09
- INDICATING INSTRUMENTS**
- Reliable low-cost battery voltage indicator for light aircraft and automobiles  
 LEWIS-12020 873-10249 01
- Rechargeable, silver-zinc battery conditioner/monitor unit and state-of-charge indicator  
 M-FS-22835 873-10486 02
- INDUCTANCE**
- Intensive care alarm system  
 GSFC-11377 873-10126 02
- INDUCTION MOTORS**
- Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
 M-FS-22088 873-10525 02
- INDUSTRIAL SAFETY**
- Pressurized lighting system  
 KSC-10644 873-10280 02
- Liquid and gaseous oxygen safety review  
 LEWIS-12041 873-10310 04
- INERT ATMOSPHERE**
- Pressurized lighting system  
 KSC-10644 873-10280 02
- INFLATABLE STRUCTURES**
- Lightweight inflatable material with low permeability  
 LANGLEY-10928 873-10400 04
- INFORMATION RETRIEVAL**
- A comprehensive program for textual concordances and statistics  
 JSC-17484 873-10049 09
- Automated data management information system (ADMIS)  
 KSC-10619 873-10053 09
- Medical information management system (MIMS): An automated hospital information system  
 GSFC-11540 873-10073 09
- INFORMATION SYSTEMS**
- Automated data management information system (ADMIS)  
 KSC-10619 873-10053 09
- INFRARED DETECTORS**
- High-sensitivity receiver for CO<sub>2</sub> laser communications  
 GSFC-11455 873-10223 02
- INFRARED RADIATION**
- High-temperature-radiation analyzer  
 ARC-10565 873-10017 03
- Carrier suppression device for a heterodyne gas analyzer  
 ARC-10785 873-10381 03
- Solar-energy absorber: Active infrared (IR) trap  
 M-FS-22743 873-10484 06
- Solar-energy absorber: Active infrared (IR) trap without glass  
 M-FS-22744 873-10485 06
- INFRARED SPECTRA**
- A magnetically focused image tube employing an opaque photocathode  
 GSFC-11602 873-10255 02
- Optical detection of oil on water  
 ARC-10649 873-10268 03
- INFRARED SPECTROSCOPY**
- A new method for the determination of thin film porosity  
 HQ-10673 873-10286 01
- INJECTORS**
- Design handbook for gaseous fuel engine injectors and combustion chambers  
 LEWIS-12154 873-10412 07
- Injector has no back splash  
 NPO-13208 873-10461 07
- INORGANIC CHEMISTRY**
- Radiochemical synthesis of pure anhydrous metal halides  
 LEWIS-11860 873-10407 04

**INORGANIC COATINGS**

Integrating-sphere coating  
GSFC-11214 B73-10403 04

**INPUT/OUTPUT ROUTINES**

Inexpensive programmable computer clock  
LEWIS-11797 B73-10308 02  
Input-output, expandable-parity network  
HQ-10728 B73-10479 02

**INSPECTION**

Detector for inspection of fire alarms  
GSFC-11600 B73-10128 06  
Improved technique for inspection of planar surfaces by microscopy and interferometry  
NPO-11893 B73-10143 03  
Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
LEWIS-11963 B73-10188 04

**INSTRUMENT ORIENTATION**

Mechanical positioning device for Langmuir probe  
NPO-11626 B73-10034 06

**INSTRUMENT PACKAGES**

Nondestructive leak testing  
LANGLEY-11561 B73-10464 06

**INSULATION**

Structural heat pipe  
GSFC-11619 B73-10364 06  
Strain arrestor plate for mounting rigid insulating tiles  
JSC-14182 B73-10465 06  
Reusable silica surface-insulation material  
ARC-10721 B73-10504 04  
RF shielded connectors  
GSFC-11215 B73-10509 01

**INTEGRATED CIRCUITS**

Glass encapsulation provides extra protection for IC semiconductor devices  
M-FS-21310 B73-10054 01  
Gyrator circuit using field effect transistors  
M-FS-21433 B73-10161 02  
Data multiplexer using a tree switch  
NPO-11333 B73-10289 02  
Data-matched filter  
JSC-14264 B73-10449 02  
Plug-in integrated/hybrid circuit  
M-FS-24470 B73-10476 01  
Input-output, expandable-parity network  
HQ-10728 B73-10479 02  
Binary-selectable detector holdoff circuit  
M-FS-22898 B73-10487 02

**INTEGRATORS**

Operational slope-limiting circuit  
NPO-11773 B73-10346 01

**INTERFERENCE GRATING**

Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10516 03

**INTERFEROMETERS**

Real time optical figure sensor  
M-FS-22123 B73-10169 02  
Linear kinematic air bearing  
NPO-13151 B73-10456 06

**INTERFEROMETRY**

Vibration measurement by pulse differential holographic interferometry  
LANGLEY-11092 B73-10075 03  
Holographic testing with a double reference beam  
JSC-17959 B73-10086 03

Improved technique for inspection of planar surfaces by microscopy and interferometry  
NPO-11893 B73-10143 03

**INTERNATIONAL SYSTEM OF UNITS**

Design parameters for toroidal and bobbin magnetics  
NPO-13441 B73-10459 01

**INVENTORY MANAGEMENT**

Logistics hardware and services control system  
KSC-10819 B73-10418 09

**INVERTERS**

Operational slope-limiting circuit  
NPO-11773 B73-10346 01  
Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
M-FS-22088 B73-10525 02

**ION EXCHANGE MEMBRANE ELECTROLYTES**

Single crystal tubes of beta alumina  
LEWIS-11844 B73-10316 04

**ION IMPLANTATION**

Silicon on sapphire for ion implantation studies  
LANGLEY-11415 B73-10522 04

**ION SOURCES**

Ion masking improves resolution in quadrupole mass spectrometers  
GSFC-11406 B73-10181 03

**IONIZATION**

Ion masking improves resolution in quadrupole mass spectrometers  
GSFC-11406 B73-10181 03

**IONIZATION CROSS SECTIONS**

Method of predicting ionization-type vacuum gage sensitivity for various gases  
LEWIS-12056 B73-10409 03

**IONIZATION GAGES**

Ion-tracer anemometer  
M-FS-21399 B73-10151 04  
Method of predicting ionization-type vacuum gage sensitivity for various gases  
LEWIS-12056 B73-10409 03

**IONIZED GASES**

Ion-tracer anemometer  
M-FS-21399 B73-10151 04  
Method of predicting ionization-type vacuum gage sensitivity for various gases  
LEWIS-12056 B73-10409 03

**IONS**

GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 B73-10442 01

**IRON**

Catalytic reactor with disposable cartridge  
ARC-10747 B73-10376 04

**IRRIGATION**

Design for waste-management system  
JSC-14486 B73-10428 05

**ISOTOPIC LABELING**

Computer system for monitoring radiorespirometry data  
ARC-10784 B73-10494 05

**ITERATIVE NETWORKS**

Minimum switching network for generating the weight of a binary vector  
NPO-11590 B73-10274 09

**ITERATIVE SOLUTION**

Computer program to determine roots of polynomials by ratio of successive derivatives  
LEWIS-11809 B73-10244 09

**J****JACKS (LIFTS)**

Redundant screwjack  
JSC-19200 B73-10070 07

**JET MIXING FLOW**

Computer program for predicting symmetric jet mixing of compressible flow in jets  
ARC-10730 B73-10263 09

**JIGS**

Self-adjusting assembly jig  
LEWIS-12034 B73-10250 07  
Universal drill jig  
M-FS-24464 B73-10324 07

**JOINING**

Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 B73-10079 04

A new concept for joining dissimilar composites  
M-FS-24307 B73-10148 04

Materials data handbook on titanium 6Al-4V  
M-FS-22796 B73-10372 04

Materials data handbooks on aluminum alloys  
M-FS-22798 B73-10373 04

Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04

Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04

**JOINTS (JUNCTIONS)**

Thermal contact resistance in a non-ideal joint  
M-FS-21775 B73-10105 03

**JOULE-THOMSON EFFECT**

Transfer of gaseous oxygen from high-pressure containers and the Joule-Thomson inversion  
KSC-10721 B73-10483 04

**JOURNAL BEARINGS**

A flexible cruciform journal bearing mount  
LEWIS-11035 B73-10001 07

**K****KERR ELECTROOPTICAL EFFECT**

Q-switched, cavity-dumped, mode-locked laser  
GSFC-11509 B73-10175 03

**KLYSTRONS**

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03

**L****LAMINAR FLOW**

Pressure drop and pumping power for fluid flow through round tubes  
M-FS-24172 B73-10186 09

**LAMINATES**

An inexpensive and effective method for calculating the strength of randomly reinforced fiber composites  
LEWIS-11985 B73-10039 04

- Residual stress effects on the impact resistance and strength of fiber composites  
LEWIS-11984 B73-10063 04
- Metal-metal reinforced laminar composites  
LEWIS-11790 B73-10068 04
- Holographic nondestructive testing of laminates  
JSC-19107 B73-10108 04
- A new concept for joining dissimilar composites  
M-FS-24307 B73-10148 04
- Graphite/polyimide laminates with near-zero thermal expansion  
JSC-17662 B73-10254 04
- Boron-epoxy tubular structure members  
ARC-10737 B73-10265 08
- Preparing thermoplastic aromatic polyimides  
LANGLEY-11372 B73-10319 04
- Transparent polymeric laminates  
ARC-10783 B73-10341 04
- Manufacture of large, lightweight parabolic antennas  
ARC-10741 B73-10375 08
- Lightweight inflatable material with low permeability  
LANGLEY-10928 B73-10400 04
- LAP JOINTS**  
New explosive seam welding concepts  
LANGLEY-11211 B73-10180 04
- LASER OUTPUTS**  
Q-switched, cavity-dumped, mode-locked laser  
GSFC-11509 B73-10175 03
- A laser head for simultaneous optical pumping of several dye lasers  
LANGLEY-11341 B73-10336 03
- LASERS**  
Detection of nitric oxide pollution  
ARC-10709 B73-10018 03
- Holographic testing with a double reference beam  
JSC-17959 B73-10086 03
- Laser system detects tower deflections  
LEWIS-11870 B73-10243 02
- Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 B73-10262 03
- Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 B73-10267 02
- Laser scanner for testing semiconductor chips  
M-FS-22693 B73-10327 02
- Hologram recording tubes  
M-FS-22590 B73-10330 03
- Laser energy converted into electric power  
NPO-13308 B73-10353 02
- Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 B73-10371 04
- Image formation in microwave holography  
ARC-10773 B73-10378 03
- Coherence-length extender  
M-FS-22434 B73-10399 03
- Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 B73-10417 03
- Laser-actuated holographic storage device  
M-FS-22768 B73-10423 03
- Binary-selectable detector holdoff circuit  
M-FS-22898 B73-10487 02
- LC CIRCUITS**  
Isolated transfer of analog signals  
LANGLEY-11312 B73-10513 02
- LEAKAGE**  
SRC seal testing  
M-FS-22426 B73-10199 01
- LEGENDRE FUNCTIONS**  
Use of multivariable asymptotic expansions in a satellite theory  
NPO-11750 B73-10303 09
- LENGTH**  
Multihead measuring tape  
LANGLEY-11266 B73-10193 07
- Instrument for measuring thin-film belt lengths  
NPO-13149 B73-10455 06
- LIFE DETECTORS**  
Unified life detection system: A concept  
ARC-10769 B73-10377 05
- LIFE SUPPORT SYSTEMS**  
Artificial atmosphere control system  
M-FS-22159 B73-10089 05
- Chemical pretreatment for the distillation of urine  
JSC-14225 B73-10224 04
- Solar-energy conversion system provides electrical power and thermal control for life-support systems  
M-FS-21628 B73-10524 06
- LIGHT (VISIBLE RADIATION)**  
Portable light detection system for the blind  
M-FS-22403 B73-10099 05
- LIGHT GAS GUNS**  
Collapsible pistons for light-gas guns  
JSC-13789 B73-10413 07
- LIGHT MODULATION**  
Design and fabrication of an experimental image forming light modulator  
M-FS-22547 B73-10182 03
- Elastic light-scattering modulator: A concept  
M-FS-22724 B73-10422 03
- LIGHT SCATTERING**  
Optical monitoring system  
M-FS-21692 B73-10050 03
- Elastic light-scattering modulator: A concept  
M-FS-22724 B73-10422 03
- LIGHT TRANSMISSION**  
Optical monitoring system  
M-FS-21692 B73-10050 03
- LIGHTING EQUIPMENT**  
Pressurized lighting system  
KSC-10644 B73-10280 02
- LIGHTNING**  
An automatic lightning detection and photographic system  
KSC-10728 B73-10043 02
- Measuring the electric field of a cloud  
KSC-10731 B73-10074 02
- Rocket borne instrument to measure electric fields inside electrified clouds  
KSC-10730 B73-10176 03
- Determining distance to lightning strokes from a single station  
KSC-10698 B73-10178 02
- LIMITER CIRCUITS**  
Gated compressor, distortionless signal limiter  
NPO-11820 B73-10387 01
- LINEAR FILTERS**  
Improved photographic prints with a linear radial transmission filter  
LANGLEY-11221 B73-10242 03
- Data-matched filter  
JSC-14264 B73-10449 02
- LINEAR RECEIVERS**  
Automatic carrier acquisition system for phase-lock-loop receivers  
NPO-11628 B73-10343 02
- LIQUID FLOW**  
Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 B73-10307 09
- LIQUID HYDROGEN**  
Fluid insulation to prevent ice formation in heat exchangers  
LEWIS-11959 B73-10028 06
- LIQUID INJECTION**  
Injector has no back splash  
NPO-13208 B73-10461 07
- LIQUID METALS**  
Gettering capsule for removing oxygen from liquid lithium systems  
LEWIS-11509 B73-10002 04
- Liquid metal porous matrix sliding electrical contact: A concept  
LEWIS-11735 B73-10164 01
- Separation of gas from liquid in a two-phase flow system  
NPO-11556 B73-10383 03
- LIQUID NITROGEN**  
Automatic device for shell freezing of liquids  
GSFC-11737 B73-10253 04
- LIQUID OXYGEN**  
Bimetallic devices for stirring fluids  
ARC-10441 B73-10029 06
- Geysering inhibitor pipe  
KSC-10615 B73-10110 07
- Handbook on thermophysical properties of oxygen  
LEWIS-11962 B73-10187 04
- Liquid and gaseous oxygen safety review  
LEWIS-12041 B73-10310 04
- LIQUID PROPELLANT ROCKET ENGINES**  
Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06
- LIQUIDS**  
Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 B73-10190 07
- Automatic device for shell freezing of liquids  
GSFC-11737 B73-10253 04
- LITHIUM**  
Gettering capsule for removing oxygen from liquid lithium systems  
LEWIS-11509 B73-10002 04
- LITHIUM COMPOUNDS**  
A new optical recording medium  
M-FS-22348 B73-10095 03
- LITHIUM ISOTOPES**  
Fast-neutron spectrometer developments  
M-FS-22279 B73-10116 03

## LOADS (FORCES)

Fiber composite materials: A survey of fiber matrix interface mechanics  
LEWIS-11924 B73-10007 04

Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
LANGLEY-11250 B73-10183 06

Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
LANGLEY-11249 B73-10184 06

Structural analysis of viscoelastic materials under thermal and pressure loading  
NPO-11727 B73-10301 09

Variable load indicator  
M-FS-21728 B73-10335 07

Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09

## LOGIC CIRCUITS

Digital notch filter  
KSC-10182 B73-10112 02

Complementary MOS four-phase logic circuits  
JSC-14240 B73-10174 01

Synchronous ten-megabit biphasic detector  
M-FS-22546 B73-10323 02

Logical-function generator  
XLA-05099 B73-10360 09

Programmable random interval generator  
JSC-14131 B73-10367 02

Input-output, expandable-parity network  
HQ-10728 B73-10479 02

Digital transmitter for data bus communications system  
JSC-14558 B73-10511 02

## LOGIC DESIGN

Logical-function generator  
XLA-05099 B73-10360 09

## LOGISTICS MANAGEMENT

Logistics hardware and services control system  
KSC-10819 B73-10418 09

## LONG TERM EFFECTS

Long-term material compatibility testing system  
NPO-11776 B73-10385 04

## LOW NOISE

Active tuning circuit  
GSFC-11340 B73-10334 02

## LOW TEMPERATURE TESTS

A flexible all-temperature pressure vessel  
M-FS-19196 B73-10158 03

## LUBRICANTS

Lubrication handbook  
M-FS-22326 B73-10062 04

## LUBRICATING OILS

Lubrication handbook  
M-FS-22326 B73-10062 04

## LUMINAIRES

Tool for installing or extracting small bulbs in limited-access spaces  
LANGLEY-11543 B73-10433 07

## LUMINANCE

Television noise-reduction device  
JSC-12607 B73-10431 02

## M

## MACH-ZEHNDER INTERFEROMETERS

Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 B73-10417 03

## MACHINE TOOLS

Universal drill jig  
M-FS-24464 B73-10324 07

## MAGNESIUM

GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 B73-10442 01

## MAGNETIC COILS

Magnetic latching valve  
NPO-11790 B73-10026 06

## MAGNETIC CONTROL

Magnetic particle clutch controls servo system  
JSC-17136 B73-10041 06

## MAGNETIC CORES

Flat-band assembly for toroidal transformer cores  
NPO-11966 B73-10391 08

Design parameters for toroidal and bobbin magnetics  
NPO-13441 B73-10459 01

## MAGNETIC FIELDS

Suspension of objects in magnetic and electric fields  
JSC-14170 B73-10058 03

Compact 20-kiloampere pulse-forming-network capacitor bank  
LEWIS-12009 B73-10171 01

Determining distance to lightning strokes from a single station  
KSC-10698 B73-10178 02

Tetrad bubble domain chip arrangement for multiplexing  
M-FS-22296 B73-10202 02

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03

## MAGNETIC FLUX

An electric motor with magnetic bearings: A concept  
XGS-07805 B73-10304 01

## MAGNETIC INDUCTION

Electromagnetic connector  
JSC-17420 B73-10125 07

## MAGNETIC LENSES

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03

## MAGNETIC PROPERTIES

Design and material selection for inverter transformer cores  
NPO-11726 B73-10142 04

## MAGNETIC PUMPING

Magnetocaloric pump  
LEWIS-11672 B73-10124 07

## MAGNETIC RECORDING

Subminiature micropower digital recorder  
ARC-10746 B73-10491 02

## MAGNETIC STORAGE

Fabrication of magnetic bubble memory overlay  
M-FS-22377 B73-10096 01

## MAGNETIC SUSPENSION

Suspension of objects in magnetic and electric fields  
JSC-14170 B73-10058 03

## MAGNETIC TAPES

Recovery of recordings from heat damaged magnetic tapes  
JSC-14219 B73-10173 02

Processor for high-density digital tape-recorded signals  
NPO-11399 B73-10354 02

Subminiature micropower digital recorder  
ARC-10746 B73-10491 02

## MAGNETIC TRANSDUCERS

Solid-state controller  
JSC-12394 B73-10466 06

## MAGNETIZATION

Subminiature micropower digital recorder  
ARC-10746 B73-10491 02

## MAGNETOHYDRODYNAMIC GENERATORS

Separation of gas from liquid in a two-phase flow system  
NPO-11556 B73-10383 03

## MANAGEMENT INFORMATION SYSTEMS

Medical information management system (MIMS): An automated hospital information system  
GSFC-11540 B73-10073 09

## MANAGEMENT METHODS

Motivation techniques for supervision  
JSC-19187 B73-10448 05

## MANEUVERABILITY

Articulated elastic-loop roving vehicles  
M-FS-22691 B73-10326 06

## MANIPULATORS

Advanced action manipulator system (ADAMS)  
M-FS-22022 B73-10204 07

A proposed hand-tool assembly for robots  
M-FS-22266 B73-10216 07

Master/slave manipulator system  
ARC-10756 B73-10496 06

## MANNED SPACE FLIGHT

Shuttle orbiter storage locker system: A study  
JSC-14448 B73-10287 08

## MANOMETERS

Traveling digital counters for micrometers  
LANGLEY-11258 B73-10042 06

## MANUFACTURING

Oven temperature controller for electronic components  
GSFC-11466 B73-10052 02

Manufacture and quality control of interconnecting wire harnesses  
M-FS-22511 B73-10211 01

Silicon-fiber blanket solar-cell array concept  
M-FS-22458 B73-10374 01

Manufacture of large, lightweight parabolic antennas  
ARC-10741 B73-10375 08

Isogrid design handbook  
M-FS-22686 B73-10395 06

Welding high-strength aluminum alloys  
M-FS-22918 B73-10481 04

## MANY BODY PROBLEM

N-body U and K matrix program  
LEWIS-11438 B73-10012 09

## MAP (PROGRAMMING LANGUAGE)

GREMEX update (Goddard research engineering management exercise)  
GSFC-11512 B73-10162 09

**MAPPING**

Means for mapping radiated fields and for measuring differential movement of antenna elements  
 NPO-13053 873-10452 02

**MARINE BIOLOGY**

Dye laser remote sensing of marine plankton  
 LANGLEY-11382 873-10359 05

**MASERS**

Improved masers for X-band and Ku band  
 NPO-11437 873-10293 02

**MASS FLOW**

Rocket plume properties measured in space simulators  
 NPO-11608 873-10137 03

Mass flow controller for gaseous propellants  
 JSC-14221 873-10207 06

Fluidic device for measuring constituent masses of a flowing binary gas mixture  
 LEWIS-11995 873-10230 06

**MASS SPECTROMETERS**

Magnetic latching valve  
 NPO-11790 873-10026 06

Ion masking improves resolution in quadrupole mass spectrometers  
 GSFC-11406 873-10181 03

Unified life detection system: A concept  
 ARC-10769 873-10377 05

**MASS TRANSFER**

Floating baffle to improve efficiency of liquid transfer from tanks  
 KSC-10639 873-10190 07

**MATERIALS HANDLING**

Geysering inhibitor pipe  
 KSC-10615 873-10110 07

Automatic microbial transfer  
 LANGLEY-11354 873-10229 05

Liquid and gaseous oxygen safety review  
 LEWIS-12041 873-10310 04

**MATERIALS RECOVERY**

Electrophoresis separator combining centrifugal separation  
 M-FS-21396 873-10328 04

**MATHEMATICAL MODELS**

Experimental verification of computer spray-combustion models  
 ARC-10689 873-10031 03

Mathematical model for predicting human vertebral fracture  
 ARC-10691 873-10033 05

Large boron-epoxy filament-wound pressure vessels  
 NPO-11900 873-10038 08

Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
 LEWIS-11996 873-10248 09

Marshall system for aerospace simulation (MARSYAS)  
 M-FS-22672 873-10432 09

**MATRICES (MATHEMATICS)**

N-body U and K matrix program  
 LEWIS-11438 873-10012 09

Node-recording method for stiffness matrix wavefront reduction in structural analysis  
 NPO-11620 873-10296 09

Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
 JSC-14494 873-10446 09

**MEASURING INSTRUMENTS**

Remote measurements by telephone  
 LEWIS-11704 873-10010 02

Apparatus for measuring electrical properties of materials  
 NPO-11749 873-10025 03

Automatic quadrature control and measuring system  
 M-FS-21660 873-10127 02

A simple, accurate depth check gauge  
 JSC-17166 873-10150 06

Rocket borne instrument to measure electric fields inside electrified clouds  
 KSC-10730 873-10176 03

Multihead measuring tape  
 LANGLEY-11266 873-10193 07

A self-supporting strain transducer  
 LANGLEY-11263 873-10201 06

Meter circuit for tuning RF amplifiers  
 NPO-11865 873-10389 02

Low-cost clearance indicator for high speed turbomachinery  
 LEWIS-12128 873-10411 02

Probes for measuring noise current in an electronic cable  
 NPO-13123 873-10454 02

Instrument for measuring thin-film belt lengths  
 NPO-13149 873-10455 06

**MECHANICAL DEVICES**

Advanced action manipulator system (ADAMS)  
 M-FS-22022 873-10204 07

A proposed hand-tool assembly for robots  
 M-FS-22266 873-10216 07

High-friction mechanical grips  
 JSC-19280 873-10234 06

**MECHANICAL DRIVES**

Mechanical planetary compensating drive system  
 ARC-10462 873-10497 06

**MECHANICAL IMPEDANCE**

Mechanical impedance and acoustic mobility measurement techniques of specifying vibration environments  
 M-FS-22016 873-10059 06

**MECHANICAL PROPERTIES**

An inexpensive and effective method for calculating the strength of randomly reinforced fiber composites  
 LEWIS-11985 873-10039 04

Residual stress effects on the impact resistance and strength of fiber composites  
 LEWIS-11984 873-10063 04

Autoclave heat treatment for prealloyed powder products  
 LEWIS-11953 873-10172 04

Materials data handbook on Inconel Alloy 718  
 M-FS-22793 873-10396 04

Materials data handbooks on stainless steels  
 M-FS-22797 873-10397 04

**MEDICAL ELECTRONICS**

Insulated ECG electrodes  
 JSC-14339 873-10220 05

**MEDICAL EQUIPMENT**

An economical arterial-pulse-wave transducer  
 GSFC-11531 873-10046 05

Flexible electroencephalogram (EEG) headband  
 LANGLEY-10927 873-10048 05

Intensive care alarm system  
 GSFC-11377 873-10126 02

A new dry biomedical electrode  
 JSC-14321 873-10146 02

Microminiaturized, biopotential conditioning system (MBCS)  
 JSC-14180 873-10236 02

New system for bathing bedridden patients,  
 ARC-10745<sup>7</sup> 873-10272 05

Vectorcardiogram  
 JSC-14427 873-10401 02

Flexible temperature probe for biological systems  
 ARC-10796 873-10498 05

**MEDICAL SCIENCE**

Medical information management system (MIMS): An automated hospital information system  
 GSFC-11540 873-10073 09

**METABOLIC WASTES**

Gas chromatography of volatile organic compounds  
 JSC-14428 873-10406 04

**METABOLISM**

Automated method for study of drug metabolism  
 ARC-10469 873-10030 04

Potassium food supplement  
 JSC-14391 873-10177 05

Pseudotachometer for mobile metabolic analyzer  
 M-FS-22909 873-10480 02

Detecting and measuring metabolic byproducts by electrochemical sensing  
 LANGLEY-11525 873-10523 05

**METAL BONDING**

New concept in brazing metallic honeycomb panels  
 LANGLEY-10957 873-10358 08

**METAL COATINGS**

Compact 20-kiloampere pulse-forming-network capacitor bank  
 LEWIS-12009 873-10171 01

Process for the production of star-tracking reticles  
 GSFC-11188 873-10488 03

**METAL FOILS**

Corrugated battery electrode  
 GSFC-11368 873-10515 01

Honeycomb battery plaque  
 GSFC-11367 873-10519 01

**METAL HALIDES**

Radiochemical synthesis of pure anhydrous metal halides  
 LEWIS-11860 873-10407 04

**METAL JOINTS**

Improved fiberglass-to-metal joint produces lighter stronger fiberglass strut  
 LEWIS-11661 873-10258 08

Low-closing-force seal  
 ARC-10775 873-10380 06

**METAL MATRIX COMPOSITES**

Fiber composite materials: A survey of fiber matrix interface mechanics  
 LEWIS-11924 873-10007 04

**METAL OXIDE SEMICONDUCTORS**

Complementary MOS four-phase logic circuits  
 JSC-14240 873-10174 01

P-channel silicon gate FET  
 M-FS-22505 873-10197 01

Integrated p-channel MOS gyrator  
 M-FS-22343 873-10217 02

**METAL PLATES**

Strain arrestor plate for mounting rigid insulating tiles  
 JSC-14182 873-10465 06

- METAL SHEETS**  
Beam lead forming tool  
M-FS-22133 73-10098 07  
Embossed metal diaphragm has two-way stretch  
NPO-11635 73-10298 08
- METAL STRIPS**  
Heated bimetal strip prevents damage of bearings by vibration  
NPO-11870 73-10348 06
- METAL WORKING**  
Densification of powder metallurgy billets by a roll consolidation technique  
LEWIS-11395 73-10040 08  
Autoclave heat treatment for prealloyed powder products  
LEWIS-11953 73-10172 04
- METAL-METAL BONDING**  
Metal-metal reinforced laminar composites  
LEWIS-11790 73-10068 04  
New explosive seam welding concepts  
LANGLEY-11211 73-10180 04  
Bonded panel, flaw detection standards  
LANGLEY-11399 73-10240 06
- METALLOGRAPHY**  
Video enhancement of X-ray and neutron radiographs  
LEWIS-11944 73-10009 03
- METALLURGY**  
Materials data handbook on titanium 6Al-4V  
M-FS-22796 73-10372 04  
Materials data handbooks on aluminum alloys  
M-FS-22798 73-10373 04  
Materials data handbook on Inconel Alloy 718  
M-FS-22793 73-10396 04  
Welding high-strength aluminum alloys  
M-FS-22918 73-10481 04
- METALS**  
Hydrogen-environment embrittlement of metals: A study  
M-FS-22540 73-10168 04
- METHANE**  
Continuous catalytic decomposition of methane  
ARC-10339 73-10016 03
- METHODOLOGY**  
Improved procedures for mass matrix-reductions in eigenvalue solutions  
NPO-11619 73-10384 09
- METHYL ALCOHOLS**  
A methanol/air fuel cell system  
M-FS-22541 73-10472 07  
Soil moisture by extraction and gas chromatography  
ARC-10748 73-10503 04
- METHYLENE BLUE**  
Oxygen sensitive paper  
M-FS-22354 73-10103 04  
Calibration of dissolved oxygen standard for analysis with methylene blue  
M-FS-22353 73-10147 04
- MICROBIOLOGY**  
Biodetection grinder  
M-FS-22833 73-10474 05
- MICROELECTRONICS**  
A new packaging and testing concept for microelectronic components  
M-FS-20936 73-10109 01  
Active tuning circuit  
GSFC-11340 73-10334 02
- MICROMETERS**  
Traveling digital counters for micrometers  
LANGLEY-11258 73-10042 06
- MICROMINIATURIZED ELECTRONIC DEVICES**  
Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 73-10236 02
- MICROORGANISMS**  
Automatic microbial transfer  
LANGLEY-11354 73-10229 05  
Measuring micro-organism gas production  
LANGLEY-11326 73-10241 05  
Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 73-10523 05
- MICROPHONES**  
Porous surface microphone for measuring acoustic signals in turbulent wind-streams  
ARC-10776 73-10490 03
- MICROSCOPY**  
Improved technique for inspection of planar surfaces by microscopy and interferometry  
NPO-11893 73-10143 03
- MICROWAVE ANTENNAS**  
Microstrip antennas  
LANGLEY-11284 73-10179 01  
High-gain antenna with singly-curved reflector  
NPO-11361 73-10291 02  
Multiple-reflection conical microwave antenna  
NPO-11661 73-10299 02
- MICROWAVE ATTENUATION**  
Microwave emission from granular silicates  
NPO-11702 73-10140 03
- MICROWAVE EQUIPMENT**  
Low-noise microwave polarimeter  
NPO-11512 73-10134 02
- MICROWAVE FILTERS**  
Extended range harmonic filter  
LEWIS-12064 73-10313 02
- MICROWAVE HOLOGRAPHY**  
Image formation in microwave holography  
ARC-10773 73-10378 03  
Microwave holography for nondestructive testing  
ARC-10774 73-10379 03
- MICROWAVE PROBES**  
A vacuum chamber feedthrough  
M-FS-21133 73-10152 01
- MICROWAVE RADIOMETERS**  
Improved noise-adding radiometer for microwave receivers  
NPO-11706 73-10345 02
- MICROWAVE SPECTRA**  
Formaldehyde monitor for automobile exhausts  
LANGLEY-11352 73-10228 04
- MICROWAVE TUBES**  
Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 73-10206 03
- MICROWAVES**  
Hermetic-coaxial package design for microwave transistors  
GSFC-10791 73-10427 01
- MILLIMETER WAVES**  
Millimeter-wave antenna system  
GSFC-10949 73-10333 01
- MINIATURIZATION**  
Miniaturized haploscope for testing binocular vision  
ARC-10759 73-10492 05
- MINIMUM VARIANCE ORBIT DETERMINATION**  
Validity test for linear error analysis  
JSC-14378 73-10219 09
- MIRRORS**  
Real time optical figure sensor  
M-FS-22123 73-10169 02
- MIXERS**  
Self-powered mixer for pressurized containers  
LEWIS-12054 73-10312 03
- MIXING**  
Experimental verification of computer spray-combustion models  
ARC-10689 73-10031 03
- MIXING CIRCUITS**  
Active tuning circuit  
GSFC-11340 73-10334 02
- MIXTURES**  
Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
LEWIS-11997 73-10231 09  
Electrophoresis separator combining centrifugal separation  
M-FS-21396 73-10328 04
- MODAL RESPONSE**  
Improved procedures for mass matrix-reductions in eigenvalue solutions  
NPO-11619 73-10384 09  
Frequencies and modes for shells of revolution (FAMSOR)  
JSC-14497 73-10444 09
- MODULATION**  
Stabilizing a gaseous optical laser  
XGS-03644 73-10517 03
- MODULES**  
Nondestructive leak testing  
LANGLEY-11561 73-10464 06
- MODULUS OF ELASTICITY**  
Fatigue of boron-aluminum composites bonds and joints  
M-FS-22325 73-10079 04
- MOISTURE CONTENT**  
Soil moisture by extraction and gas chromatography  
ARC-10748 73-10503 04
- MOLDING MATERIALS**  
Improved mold release for filled-silicone compounds  
JSC-19300 73-10338 04
- MOLDS**  
Improved mold release for filled-silicone compounds  
JSC-19300 73-10338 04
- MOLECULAR STRUCTURE**  
TLC determination of functionality in prepolymers  
NPO-11731 73-10037 04
- MONEL (TRADEMARK)**  
Monel-shot and screen regenerators  
GSFC-11593 73-10462 03
- MONITORS**  
Flexible electroencephalogram (EEG) headband  
LANGLEY-10927 73-10048 05  
Optical monitoring system  
M-FS-21692 73-10050 03  
Monitor for physical property changes in solid propellants  
ARC-10702 73-10130 03

- Time-based priority selection for analog circuits  
M-FS-24242 B73-10154 02  
An inexpensive vehicle speed detector  
M-FS-22601 B73-10157 02  
Bipotential monitoring with inexpensive office-type cassette recorders  
M-FS-22566 B73-10167 02  
Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 B73-10212 03  
Bacterial contamination monitor  
GSFC-10879 B73-10222 05  
Formaldehyde monitor for automobile exhausts  
LANGLEY-11352 B73-10228 04  
Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 B73-10236 02  
Electro-optical device for monitoring wire size  
LANGLEY-11358 B73-10321 02  
Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
M-FS-24424 B73-10325 06  
Safety monitoring system for radio-isotope thermoelectric generators  
NPO-13285 B73-10352 02  
Particulate and aerosol detector  
LANGLEY-11434 B73-10357 04  
Pulse stretcher for narrow pulses  
JSC-14130 B73-10365 02  
Vectorcardiogram  
JSC-14427 B73-10401 02  
Sequential-strip and sequential-disk filters  
JSC-14592 B73-10430 06  
Pseudotachometer for mobile metabolic analyzer  
M-FS-22909 B73-10480 02  
Rechargeable, silver-zinc battery conditioner/monitor unit and state-of-charge indicator  
M-FS-22835 B73-10486 02  
Computer system for monitoring radio-respirometry data  
ARC-10784 B73-10494 05  
Isolated transfer of analog signals  
LANGLEY-11312 B73-10513 02  
Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06  
Detecting and measuring metabolic byproducts by electrochemical sensing  
LANGLEY-11525 B73-10523 05
- MOTION PICTURES**  
Motion compensator for holographic motion picture camera  
M-FS-22517 B73-10434 03  
Photography of random motion with a holographic camera  
M-FS-22537 B73-10435 03
- MOTIVATION**  
Motivation techniques for supervision  
JSC-19187 B73-10448 05
- MUFFLERS**  
Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 B73-10471 03
- MULTICHANNEL COMMUNICATION**  
Circularly-polarized multiband telemetry tracking antenna  
NPO-11264 B73-10288 02
- MULTIPLEXING**  
A remote test parameter profile display  
LEWIS-11872 B73-10006 02  
Time-based priority selection for analog circuits  
M-FS-24242 B73-10154 02  
Tetrad bubble domain chip arrangement for multiplexing  
M-FS-22296 B73-10202 02  
Data multiplexer using a tree switch  
NPO-11333 B73-10289 02  
Flexible format, computer accessed telemetry system  
NPO-11358 B73-10290 02
- MULTIVIBRATORS**  
Signal conditioner test set  
KSC-10750 B73-10189 02
- MYLAR (TRADEMARK)**  
Lightweight inflatable material with low permeability  
LANGLEY-10928 B73-10400 04
- N**
- NAVIER-STOKES EQUATION**  
Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 B73-10307 09
- NAVIGATION AIDS**  
Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
NPO-13051 B73-10460 02
- NETWORK ANALYSIS**  
A linear circuit analysis program with stiff systems capability  
LANGLEY-11184 B73-10091 09  
Computer program for compressible flow network analysis  
LEWIS-11859 B73-10246 09
- NEUTRON IRRADIATION**  
Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 B73-10027 03
- NEUTRON SOURCES**  
Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06
- NEUTRON SPECTROMETERS**  
Fast-neutron spectrometer developments  
M-FS-22279 B73-10116 03
- NEWTON-RAPHSON METHOD**  
The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 B73-10445 09
- NICKEL**  
Vapor-deposited platinum as a fuel-cell catalyst  
M-FS-21317 B73-10475 04  
Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- NICKEL ALLOYS**  
Metal-metal reinforced laminar composites  
LEWIS-11790 B73-10068 04  
Oxidation resistant, thoria-dispersed nickel-chromium-aluminum alloy  
LEWIS-11541 B73-10077 04  
Resistance spot welding of dispersion-strengthened nickel alloys  
LEWIS-12075 B73-10315 04
- Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04
- NICKEL CADMIUM BATTERIES**  
Corrugated battery electrode  
GSFC-11368 B73-10515 01  
Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- NICKEL COATINGS**  
High-friction mechanical grips  
JSC-19260 B73-10234 06
- NICKEL PLATE**  
Selective coating for collecting solar energy on aluminum  
M-FS-22562 B73-10527 04
- NICKEL ZINC BATTERIES**  
Corrugated battery electrode  
GSFC-11368 B73-10515 01  
Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- NIOBIUM ALLOYS**  
Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08  
A spiraled niobium tin superconductive ribbon  
LEWIS-11726 B73-10044 04  
Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04  
Braze alloys for high temperature service  
LEWIS-11374 B73-10206 06
- NITRIC OXIDE**  
Detection of nitric oxide pollution  
ARC-10709 B73-10018 03
- NITROGEN**  
An equation of state for oxygen and nitrogen  
JSC-14465 B73-10394 04
- NODES (STANDING WAVES)**  
Node-recording method for stiffness matrix wavefront reduction in structural analysis  
NPO-11620 B73-10296 09
- NOISE PROPAGATION**  
A theoretical study of aerodynamic noise generation  
M-FS-24167 B73-10209 03
- NOISE REDUCTION**  
Radial honeycomb core  
ARC-10727 B73-10340 08  
All-digital phase-lock loops for noise-free signals  
NPO-11914 B73-10350 01  
Television noise-reduction device  
JSC-12607 B73-10431 02  
Improved method for design of expansion-chamber mufflers with application to operational helicopter  
LANGLEY-11548 B73-10471 03
- NOMOGRAPHS**  
Nomograph for prediction of RF-breakdown voltages  
NPO-11819 B73-10386 01
- NONDESTRUCTIVE TESTS**  
Video enhancement of X-ray and neutron radiographs  
LEWIS-11944 B73-10009 03  
Fatigue testing device  
LANGLEY-10426 B73-10047 07  
Prototype ultrasonic instrument for quantitative testing  
M-FS-22350 B73-10051 02

Holographic nondestructive testing of laminates  
JSC-19107 B73-10108 04

Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 B73-10212 03

Bonded panel, flaw detection standards  
LANGLEY-11399 B73-10240 06

Digital servo control of random sound fields  
NPO-11623 B73-10297 02

Electro-optical device for monitoring wire size  
LANGLEY-11358 B73-10321 02

Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
M-FS-24424 B73-10325 06

Laser scanner for testing semiconductor chips  
M-FS-22693 B73-10327 02

Microwave holography for nondestructive testing  
ARC-10774 B73-10379 03

Flaw detection by mechanical resonant measurement  
M-FS-19218 B73-10440 03

Nondestructive leak testing  
LANGLEY-11561 B73-10464 06

X-ray opaque additive for inspection of weld joints  
M-FS-22896 B73-10528 08

**NONFLAMMABLE MATERIALS**  
Nonflammable potting-encapsulating and conformal coating compounds  
JSC-14164 B73-10102 04

**NONLINEAR SYSTEMS**  
A nonlinear-coherence receiver  
NPO-11921 B73-10144 02

**NOZZLE DESIGN**  
Air-atomizing splash-cone fuel nozzle reduces pollutant emissions from turbojet engines  
LEWIS-11918 B73-10200 06

Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 B73-10233 09

**NOZZLE FLOW**  
Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 B73-10233 09

**NUCLEAR FUELS**  
PPUAS-photopack unfolding and self-shielding program  
NPO-13188 B73-10087 09

**NUCLEAR RADIATION**  
Multilayer flat electrical cable  
ARC-10734 B73-10264 01

**NUCLEAR REACTOR CONTROL**  
Fast-neutron spectrometer developments  
M-FS-22279 B73-10116 03

**NUMERICAL ANALYSIS**  
Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
JSC-14496 B73-10443 09

Frequencies and modes for shells of revolution (FAMSOR)  
JSC-14497 B73-10444 09

The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 B73-10445 09

**NUMERICAL INTEGRATION**  
Marshall system for aerospace simulation (MARSYAS)  
M-FS-22872 B73-10432 09

**NUTATION**

Improved syncom-type fluid damper  
GSFC-11205 B73-10478 06

**NUTRITION**

Potassium food supplement  
JSC-14391 B73-10177 05

**O****O RING SEALS**

Low-closing-force seal  
ARC-10775 B73-10380 06

Container seal for dusty environment  
LANGLEY-10962 B73-10416 07

**OCULOMETERS**

Eye-controlled "teletypewriter"  
LANGLEY-11564 B73-10514 02

**OHMMETERS**

Positive contact resistance soldering unit  
KSC-10242 B73-10145 02

**OILS**

Optical detection of oil on water  
ARC-10649 B73-10268 03

**ONE DIMENSIONAL FLOW**

Computer program for compressible flow network analysis  
LEWIS-11859 B73-10246 09

Computer program calculates quasi-one-dimensional flow across face seals and narrow slots  
LEWIS-11996 B73-10248 09

**OPERATIONAL HAZARDS**

Liquid and gaseous oxygen safety review  
LEWIS-12041 B73-10310 04

**OPTICAL COMMUNICATION**

High-sensitivity receiver for CO<sub>2</sub> laser communications  
GSFC-11455 B73-10223 02

**OPTICAL DATA PROCESSING**

A generalized approach to computer synthesis of digital holograms  
M-FS-21973 B73-10101 09

**OPTICAL DENSITY**

Improved discrimination in photographic density contouring  
JSC-12588 B73-10441 03

**OPTICAL EQUIPMENT**

Measurement of dimensions and alignment with optical instruments  
M-FS-22168 B73-10061 06

Light-direction sensor based on birefringency  
NPO-11201 B73-10131 03

Linear kinematic air bearing  
NPO-13151 B73-10456 06

Process for the production of star-tracking reticles  
GSFC-11188 B73-10488 03

Miniaturized haploscope for testing binocular vision  
ARC-10759 B73-10492 05

Stereoscopic television system  
ARC-10160 B73-10499 02

True airspeed measured by airborne laser Doppler velocimeter  
ARC-10763 B73-10506 02

Moisture-resistant coatings for optical components  
ARC-10749 B73-10507 04

**OPTICAL FILTERS**

Improved photographic prints with a linear radial transmission filter  
LANGLEY-11221 B73-10242 03

**OPTICAL HETERODYNING**

Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 B73-10262 03

**OPTICAL MEASURING INSTRUMENTS**

Optical monitoring system  
M-FS-21692 B73-10050 03

Measurement of dimensions and alignment with optical instruments  
M-FS-22168 B73-10061 06

Real time optical figure sensor  
M-FS-22123 B73-10169 02

**OPTICAL PROPERTIES**

A new optical recording medium  
M-FS-22348 B73-10095 03

**OPTICAL PUMPING**

A laser head for simultaneous optical pumping of several dye lasers  
LANGLEY-11341 B73-10336 03

**OPTICAL RADAR**

Atmospheric temperature measurements by Raman laser scattering  
LEWIS-12065 B73-10251 03

Binary-selectable detector holdoff circuit  
M-FS-22898 B73-10487 02

**OPTICAL REFLECTION**

Measurement of X-ray scattering by optical surfaces  
GSFC-11590 B73-10283 03

Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10518 03

**OPTICAL SCANNERS**

Wide-field reflective scanning optical systems  
JSC-14096 B73-10279 03

Laser scanner for testing semiconductor chips  
M-FS-22693 B73-10327 02

Stereoscopic television system  
ARC-10160 B73-10499 02

**OPTICAL TRACKING**

Laser system detects tower deflections  
LEWIS-11870 B73-10243 02

**OPTICS**

Fine guidance for a spaceborne telescope  
GSFC-11487 B73-10468 03

**OPTIMIZATION**

A summary report on system effectiveness and optimization study  
M-FS-22126 B73-10104 09

Optimization of structures on the basis of fracture mechanics and reliability criteria  
NPO-11645 B73-10276 06

**OPTOMETRY**

Miniaturized haploscope for testing binocular vision  
ARC-10759 B73-10492 05

**ORBIT PERTURBATION**

N-body U and K matrix program  
LEWIS-11438 B73-10012 09

**ORGANIC CHEMISTRY**

A new intermediate for the production of flexible stable polymers  
M-FS-22355 B73-10080 04

**ORGANIC COMPOUNDS**

Gas chromatography of volatile organic compounds  
JSC-14428 B73-10406 04

**ORGANIC LIQUIDS**

Radiochemical synthesis of pure anhydrous metal halides  
LEWIS-11860 B73-10407 04

## ORGANOMETALLIC POLYMERS

Semi-organic structural adhesive for aluminum  
M-FS-21328 B73-10071 04

## ORIENTATION

LEAPS (Laser electro-optical alignment pole for surveying)  
GSFC-11262 B73-10122 02

## OSCILLATION DAMPERS

Improved syncom-type fluid damper  
GSFC-11205 B73-10478 06

## OSCILLATORS

Active tuning circuit  
GSFC-11340 B73-10334 02  
Ankylosis-stabilized oscillator  
GSFC-11513 B73-10392 02

## OSCILLOSCOPES

Digital video display system  
NPO-11342 B73-10132 02  
Alphanumeric character generator for oscilloscope  
GSFC-11582 B73-10370 02

## OVENS

Oven temperature controller for electronic components  
GSFC-11466 B73-10052 02

## OXIDATION RESISTANCE

Oxidation resistant, thorium-dispersed nickel-chromium-aluminum alloy  
LEWIS-11541 B73-10077 04  
Metallic composites as high-temperature fasteners  
M-FS-22438 B73-10081 04  
Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04

## OXIDIZERS

Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07

## OXYGEN

Gettering capsule for removing oxygen from liquid lithium systems  
LEWIS-11509 B73-10002 04  
Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08  
Handbook on thermophysical properties of oxygen  
LEWIS-11962 B73-10187 04  
Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
LEWIS-11963 B73-10188 04  
Liquid and gaseous oxygen safety review  
LEWIS-12041 B73-10310 04  
An equation of state for oxygen and nitrogen  
JSC-14465 B73-10394 04  
A methanol/air fuel cell system  
M-FS-22541 B73-10472 07  
Transfer of gaseous oxygen from high-pressure containers and the Joule-Thomson inversion  
KSC-10721 B73-10483 04

**OXYGEN ANALYZERS**  
Rapid detection of bacteria in foods and biological fluids  
GSFC-11738 B73-10045 05  
Oxygen sensitive paper  
M-FS-22354 B73-10103 04  
Calibration of dissolved oxygen standard for analysis with methylene blue  
M-FS-22353 B73-10147 04

## OXYGEN SUPPLY EQUIPMENT

Artificial atmosphere control system  
M-FS-22159 B73-10089 05

## P

## P-TYPE SEMICONDUCTORS

Integrated p-channel MOS gyrator  
M-FS-22343 B73-10217 02

## PACKAGING

Hermetic-coaxial package design for microwave transistors  
GSFC-10791 B73-10427 01

## PALLADIUM ALLOYS

Stable palladium alloys for diffusion of hydrogen  
NPO-11747 B73-10024 04

## PAPERS

Fire retardant cellulosic foam  
JSC-14336 B73-10085 04  
Oxygen sensitive paper  
M-FS-22354 B73-10103 04

## PARABOLIC ANTENNAS

Millimeter-wave antenna system  
GSFC-10949 B73-10333 01  
Manufacture of large, lightweight parabolic antennas  
ARC-10741 B73-10375 08  
Means for mapping radiated fields and for measuring differential movement of antenna elements  
NPO-13053 B73-10452 02

## PARABOLIC REFLECTORS

High-gain antenna with singly-curved reflector  
NPO-11361 B73-10291 02  
Multiple-reflection conical microwave antenna  
NPO-11661 B73-10299 02  
Millimeter-wave antenna system  
GSFC-10949 B73-10333 01

## PARITY

Input-output, expandable-parity network  
HQ-10728 B73-10479 02

## PARTICLE MOTION

Particle-fluid interactions for flow measurements  
M-FS-21727 B73-10117 06  
Zeta potential control for electrophoresis cells  
M-FS-22333 B73-10260 04

## PARTICLE SIZE DISTRIBUTION

Carbide factor predicts rolling-element bearing fatigue life  
LEWIS-11940 B73-10008 07

## PARTICULATE SAMPLING

Particulate and aerosol detector  
LANGLEY-11434 B73-10357 04

## PASSENGERS

System for measuring passenger reaction to transportation-vehicle vibration  
LANGLEY-11353 B73-10436 05

## PENETROMETERS

Glass transition temperatures of liquid prepolymers obtained by thermal penetrometry  
NPO-11730 B73-10036 04

## PEPTIDES

Reductive cleavage of the peptide bond  
LRL-10026 B73-10194 04

## PERFORMANCE PREDICTION

Method for predicting rotor free-wake positions and the resulting rotor blade airloads  
LANGLEY-10674 B73-10239 06

A new algorithm for finding survival coefficients employed in reliability equations  
M-FS-22295 B73-10256 09

Optimization of structures on the basis of fracture mechanics and reliability criteria  
NPO-11645 B73-10276 06

Dynamic power load simulator  
JSC-14285 B73-10305 02

Program for calculating total-efficiency of specific-speed characteristics of centrifugal compressors  
LEWIS-12008 B73-10309 09

Nomograph for prediction of RF-breakdown voltages  
NPO-11819 B73-10386 01

## PERFORMANCE TESTS

Poppet valve tester  
LEWIS-11655 B73-10415 07

## PERMEATING

Rubber composition compatible with hydrazine  
NPO-11440 B73-10019 04

## PERMUTATIONS

Logical-function generator  
XLA-05099 B73-10360 09

## PERT

GREMEX update (Goddard research engineering management exercise)  
GSFC-11512 B73-10162 09

## PHASE DETECTORS

Synchro phase selector aid  
LANGLEY-11282 B73-10160 01  
Synchronous ten-megabit biphasic detector  
M-FS-22546 B73-10323 02

## PHASE LOCK DEMODULATORS

Synchronous ten-megabit biphasic detector  
M-FS-22546 B73-10323 02

## PHASE LOCKED SYSTEMS

Code-regenerative clean-up loop for a ranging transponder  
NPO-11707 B73-10141 02  
Automatic carrier acquisition system for phase-lock-loop receivers  
NPO-11628 B73-10343 02  
All-digital phase-lock loops for noise-free signals  
NPO-11914 B73-10350 01

## PHASE MODULATION

Two-carrier command modulation system  
NPO-11548 B73-10273 02

## PHASE SHIFT CIRCUITS

Four-phase differential phase shift resolver  
JSC-14065 B73-10093 02

## PHASE SHIFT KEYING

Carrier extraction circuit  
JSC-14262 B73-10094 02  
Phase shift keyed, pulse code modulated signal synchronizer  
JSC-12462 B73-10107 02

## PHASE VELOCITY

Ultrasonic calibration device  
LANGLEY-11435 B73-10420 03

## PHASED ARRAYS

Microstrip antennas  
LANGLEY-11284 B73-10179 01

## PHASED LOCKED SYSTEMS

Frequency control circuit for all-digital phase-lock loops  
NPO-11936 B73-10351 01  
Data-aided carrier tracking loops  
NPO-11282 B73-10356 01

**PHOTOCATHODES**

A magnetically focused image tube employing an opaque photocathode  
GSFC-11602 B73-10255 02

**PHOTOCONDUCTORS**

Laser addressed holographic memory system  
M-FS-22565 B73-10155 03

Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
NPO-13051 B73-10460 02

**PHOTODIODES**

Solar aspect determination system  
GSFC-11444 B73-10129 02

Binary-selectable detector holdoff circuit  
M-FS-22898 B73-10487 02

**PHOTOELECTRIC CELLS**

Portable light detection system for the blind  
M-FS-22403 B73-10099 05

**PHOTOGRAPHIC PROCESSING**

Improved photographic prints with a linear radial transmission filter  
LANGLEY-11221 B73-10242 03

**PHOTOGRAPHIC RECORDING**

An automatic lightning detection and photographic system  
KSC-10728 B73-10043 02

A high-speed spectrograph shutter  
HQ-10635 B73-10368 01

**PHOTOGRAPHY**

Bacterial contamination monitor  
GSFC-10879 B73-10222 05

Improved photographic prints with a linear radial transmission filter  
LANGLEY-11221 B73-10242 03

A real time moving-scene holographic camera  
M-FS-21087 B73-10421 03

Photography of random motion with a holographic camera  
M-FS-22537 B73-10435 03

**PHOTOMETERS**

Optical monitoring system  
M-FS-21692 B73-10050 03

Laser system detects tower deflections  
LEWIS-11970 B73-10243 02

Automatic focus control for facsimile camera  
LANGLEY-11213 B73-10361 02

**PHOTOMULTIPLIER TUBES**

Light-direction sensor based on birefringency  
NPO-11201 B73-10131 03

**PHOTON BEAMS**

PPUAS-photopeak unfolding and self-shielding program  
NPO-13188 B73-10087 09

**PHYSICAL CHEMISTRY**

Method for estimating solubility parameter  
NPO-11647 B73-10022 04

Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
LEWIS-11997 B73-10231 09

**PHYSICAL PROPERTIES**

Monitor for physical property changes in solid propellants  
ARC-10702 B73-10130 03

An improved technique for the use of zinc-rich coatings  
KSC-10766 B73-10149 04

Handbook on thermophysical properties of oxygen  
LEWIS-11962 B73-10187 04

Materials data handbook on titanium 6Al-4V  
M-FS-22796 B73-10372 04

Materials data handbooks on aluminum alloys  
M-FS-22798 B73-10373 04

Materials data handbook on Inconel Alloy 718  
M-FS-22793 B73-10396 04

Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04

**PHYSIOLOGICAL RESPONSES**

Microminiaturized, biopotential conditioning system (MBCS)  
JSC-14180 B73-10236 02

Programmable random interval generator  
JSC-14131 B73-10367 02

**PICRATES**

Increasing the sensitivity of the Jaffe reaction for creatinine  
NPO-11587 B73-10021 04

**PIGMENTS**

'Dry-column' chromatography of plant pigments  
ARC-10780 B73-10271 04

**PIPELINES**

New explosive seam welding concepts  
LANGLEY-11211 B73-10180 04

**PIPES (TUBES)**

Method for casting polyethylene pipe  
ARC-10706 B73-10032 08

Geysering inhibitor pipe  
KSC-10615 B73-10110 07

Metal tube used as solar engine  
ARC-10461 B73-10493 03

Grain refinement control in gas-shielded arc welding of aluminum tubing  
JSC-10995 B73-10508 08

**PISTONS**

Bimetallic devices for stirring fluids  
ARC-10441 B73-10029 06

Collapsible pistons for light-gas guns  
JSC-13789 B73-10413 07

Poppet valve tester  
LEWIS-11655 B73-10415 07

**PLANAR STRUCTURES**

An inexpensive and effective method for calculating the strength of randomly reinforced fiber composites  
LEWIS-11985 B73-10039 04

Improved technique for inspection of planar surfaces by microscopy and interferometry  
NPO-11893 B73-10143 03

**PLANETARY SURFACES**

Microwave emission from granular silicates  
NPO-11702 B73-10140 03

**PLANKTON**

Dye laser remote sensing of marine plankton  
LANGLEY-11382 B73-10359 05

**PLANTS (BOTANY)**

'Dry-column' chromatography of plant pigments  
ARC-10780 B73-10271 04

**PLASMA DYNAMICS**

Laser energy converted into electric power  
NPO-13308 B73-10353 02

**PLASMA FLUX MEASUREMENTS**

A vacuum chamber feedthrough  
M-FS-21133 B73-10152 01

**PLASMA SPRAYING**

High-friction mechanical grips  
JSC-19260 B73-10234 06

**PLASTIC DEFORMATION**

Hydrogen-environment embrittlement of metals: A study  
M-FS-22540 B73-10168 04

**PLASTICS**

Improved mold release for filled-silicone compounds  
JSC-19300 B73-10338 04

**PLATES (STRUCTURAL MEMBERS)**

New explosive seam welding concepts  
LANGLEY-11211 B73-10180 04

**PLATINUM**

Vapor-deposited platinum as a fuel-cell catalyst  
M-FS-21317 B73-10475 04

**PLOTTERS**

Digital video display system  
NPO-11342 B73-10132 02

**PLOTTING**

Marshall system for aerospace simulation (MARSYAS)  
M-FS-22672 B73-10432 09

**PLUTONIUM OXIDES**

PPUAS-photopeak unfolding and self-shielding program  
NPO-13188 B73-10087 09

**PLYWOOD**

Holographic nondestructive testing of laminates  
JSC-19107 B73-10108 04

**PNEUMATIC EQUIPMENT**

Fail-safe bidirectional valve driver  
NPO-11958 B73-10450 07

**PNEUMATIC PROBES**

Total-pressure measurement in pulsating flows  
LEWIS-12077 B73-10252 03

**POLARIMETERS**

Low-noise microwave polarimeter  
NPO-11512 B73-10134 02

**POLARIZED LIGHT**

Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 B73-10262 03

Optical detection of oil on water  
ARC-10649 B73-10268 03

**POLARIZED RADIATION**

Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 B73-10027 03

**POLARIZERS**

Light-direction sensor based on birefringency  
NPO-11201 B73-10131 03

**POLYBENZIMIDAZOLE**

Fabrication techniques for polybenzimidazole composites  
ARC-10724 B73-10269 04

**POLYCARBONATES**

Transparent polymeric laminates  
ARC-10783 B73-10341 04

**POLYESTERS**

Production of circular polymer-glass fabric composites  
M-FS-22125 B73-10069 04

**POLYETHYLENES**

Method for casting polyethylene pipe  
ARC-10706 B73-10032 08

An improved holographic recording medium  
M-FS-22532 B73-10166 09

## POLYIMIDE RESINS

- Production of circular polymer-glass fabric composites  
M-FS-22125 B73-10069 04  
Lightweight graphite/polyimide panels  
JSC-14375 B73-10121 04  
Multilayer flat electrical cable  
ARC-10734 B73-10264 01  
Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04
- POLYIMIDES**  
A new intermediate for the production of flexible stable polymers  
M-FS-22355 B73-10080 04  
Preparation of prepreg graphite tape with insoluble polymer  
JSC-14313 B73-10084 04  
Flammability control for electrical cables and connectors  
M-FS-21584 B73-10235 02  
Graphite/polyimide laminates with near-zero thermal expansion  
JSC-17662 B73-10254 04  
Preparing thermoplastic aromatic polyimides  
LANGLEY-11372 B73-10319 04  
Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04
- POLYMER CHEMISTRY**  
A new intermediate for the production of flexible stable polymers  
M-FS-22355 B73-10080 04
- POLYMERIC FILMS**  
Effects of environmental exposure on cryogenic thermal insulation materials  
LEWIS-12007 B73-10213 04
- POLYMERIZATION**  
Technique for the polymerization of monomers for PPO/graphite fiber composites  
LEWIS-11879 B73-10014 04
- POLYMERS**  
Method for estimating solubility parameter  
NPO-11647 B73-10022 04  
Self-sterilizing polymers  
M-FS-22054 B73-10090 04  
Low-resistivity homogeneous elastomers  
NPO-11881 B73-10349 04
- POLYNOMIALS**  
Computer program to determine roots of polynomials by ratio of successive derivatives  
LEWIS-11809 B73-10244 09  
Minimal hardware, binary sequence pseudonoise generator and detector  
NPO-11406 B73-10292 01
- POLYQUINOXALINES**  
Technique for the polymerization of monomers for PPO/graphite fiber composites  
LEWIS-11879 B73-10014 04
- PORCELAIN**  
Refractory porcelain enamel passive-thermal-control coating for high-temperature superalloys  
M-FS-22324 B73-10215 04
- POROSITY**  
A new method for the determination of thin film porosity  
HQ-10673 B73-10286 01  
Corrugated battery electrode  
GSFC-11368 B73-10515 01

- Honeycomb battery plaque  
GSFC-11367 B73-10519 01
- POROUS WALLS**  
Porous surface microphone for measuring acoustic signals in turbulent windstreams  
ARC-10776 B73-10490 03
- POSITIONING DEVICES (MACHINERY)**  
Mechanical positioning device for Langmuir probe  
NPO-11626 B73-10034 06  
Magnetic particle clutch controls servo system  
JSC-17136 B73-10041 06
- POTASSIUM COMPOUNDS**  
Potassium food supplement  
JSC-14391 B73-10177 05  
Ultraviolet reflective coating  
GSFC-11786 B73-10469 04
- POTENTIOMETERS (INSTRUMENTS)**  
Signal conditioner for potentiometer type transducers  
LEWIS-11822 B73-10015 01
- POTTING COMPOUNDS**  
Nonflammable potting-encapsulating and conformal coating compounds  
JSC-14164 B73-10102 04  
RF shielded connectors  
GSFC-11215 B73-10509 01
- POWDER METALLURGY**  
Densification of powder metallurgy billets by a roll consolidation technique  
LEWIS-11395 B73-10040 08  
Autoclave heat treatment for prealloyed powder products  
LEWIS-11953 B73-10172 04
- POWER AMPLIFIERS**  
Isolated output for class-D dc amplifiers  
M-FS-21616 B73-10331 02
- POWER CONDITIONING**  
Signal conditioner for potentiometer type transducers  
LEWIS-11822 B73-10015 01
- POWER SPECTRA**  
Spectral analysis program (SAP)  
JSC-14310 B73-10227 09
- POWER SUPPLIES**  
Low cost uniform heat source  
LEWIS-11903 B73-10011 02
- PREAMPLIFIERS**  
Active tuning circuit  
GSFC-11340 B73-10334 02
- PREPOLYMERS**  
Glass transition temperatures of liquid prepolymers obtained by thermal penitrometry  
NPO-11730 B73-10036 04  
TLC determination of functionality in prepolymers  
NPO-11731 B73-10037 04
- PRESSURE DISTRIBUTION**  
Thermal contact resistance in a non-ideal joint  
M-FS-21775 B73-10105 03  
Computer program to determine pressure distributions and forces on blunt bodies of revolution  
LANGLEY-11197 B73-10362 09
- PRESSURE DROP**  
Pressure drop and pumping power for fluid flow through round tubes  
M-FS-24172 B73-10186 09
- PRESSURE EFFECTS**  
Structural analysis of viscoelastic materials under thermal and pressure loading  
NPO-11727 B73-10301 09

## PRESSURE GAGES

- Traveling digital counters for micrometers  
LANGLEY-11258 B73-10042 06
- PRESSURE MEASUREMENTS**  
Total-pressure measurement in pulsating flows  
LEWIS-12077 B73-10252 03
- PRESSURE REGULATORS**  
Mass flow controller for gaseous propellants  
JSC-14221 B73-10207 06  
Thermally actuated valve  
NPO-11846 B73-10347 06
- PRESSURE SENSORS**  
Signal conditioner for potentiometer type transducers  
LEWIS-11822 B73-10015 01  
An economical arterial-pulse-wave transducer  
GSFC-11531 B73-10046 05  
Limited tactile stimulus for prosthetic hands  
M-FS-16570 B73-10078 05  
Artificial atmosphere control system  
M-FS-22159 B73-10089 05  
Leak detector-measurer  
M-FS-21761 B73-10203 07  
Measuring micro-organism gas production  
LANGLEY-11326 B73-10241 05  
Sequential-strip and sequential-disk filters  
JSC-14592 B73-10430 06
- PRESSURE VESSEL DESIGN**  
Design guide for glass fiber reinforced metal pressure vessel  
LEWIS-12042 B73-10311 08
- PRESSURE VESSELS**  
Large boron-epoxy filament-wound pressure vessels  
NPO-11900 B73-10038 08  
A flexible all-temperature pressure vessel  
M-FS-19196 B73-10158 03  
Leak detector-measurer  
M-FS-21761 B73-10203 07  
Embossed metal diaphragm has two-way stretch  
NPO-11635 B73-10298 08  
Self-powered mixer for pressurized containers  
LEWIS-12054 B73-10312 03  
Probability of stress-corrosion fracture under random loading  
NPO-13113 B73-10453 04
- PRESSURIZED CABINS**  
Leak detector-measurer  
M-FS-21761 B73-10203 07
- PRINTED CIRCUITS**  
A new packaging and testing concept for microelectronic components  
M-FS-20936 B73-10109 01  
Welded printed circuit (pc) stick  
GSFC-11773 B73-10393 01  
New standoffs provide high-reliability component mounting for printed wiring boards  
LANGLEY-11176 B73-10512 01
- PRINTING**  
Improved photographic prints with a linear radial transmission filter  
LANGLEY-11221 B73-10242 03
- PROBABILITY THEORY**  
Validity test for linear error analysis  
JSC-14378 B73-10219 09

**PROBES**

Probes for measuring noise current in an electronic cable  
 NPO-13123 873-10454 02

**PROBLEM SOLVING**

Computer program to determine roots of polynomials by ratio of successive derivatives  
 LEWIS-11809 873-10244 09  
 Minimal hardware, binary sequence pseudonoise generator and detector  
 NPO-11406 873-10292 01

**PRODUCT DEVELOPMENT**

Computer program for the design of toroidal transformers  
 LEWIS-11878 873-10214 09  
 Design Guide for glass fiber reinforced metal pressure vessel  
 LEWIS-12042 873-10311 08  
 Process for the production of star-tracking reticles  
 GSFC-11188 873-10488 03

**PROJECT MANAGEMENT**

GREMEX update (Goddard research engineering management exercise)  
 GSFC-11512 873-10162 09

**PROPELLANT SPRAYS**

Injector has no back splash  
 NPO-13208 873-10461 07

**PROPORTIONAL COUNTERS**

Fast-neutron spectrometer developments  
 M-FS-22279 873-10116 03

**PROSTHETIC DEVICES**

Limited tactile stimulus for prosthetic hands  
 M-FS-16570 873-10078 05  
 A proposed hand-tool assembly for robots  
 M-FS-22266 873-10218 07

**PROTECTION**

Integral aircraft passenger seat  
 ARC-10799 873-10495 05

**PROTECTIVE COATINGS**

An improved technique for the use of zinc-rich coatings  
 KSC-10766 873-10149 04  
 Applying high-emittance and solar-absorbance coating to aluminum  
 LANGLEY-10151 873-10238 04  
 New concept in brazing metallic honey-comb panels  
 LANGLEY-10957 873-10358 08  
 Moisture-resistant coatings for optical components  
 ARC-10749 873-10507 04

**PROTEINS**

Zeta potential control for electrophoresis cells  
 M-FS-22333 873-10260 04

**PROTRACTORS**

Multihead measuring tape  
 LANGLEY-11266 873-10193 07

**PULSE AMPLITUDE**

Peak-holding circuit for extremely narrow pulses  
 JSC-14129 873-10317 02  
 Pulse stretcher for narrow pulses  
 JSC-14130 873-10365 02

**PULSE CODE MODULATION**

A technique to eliminate false lock in PCM demodulation  
 JSC-12494 873-10106 02  
 Phase shift keyed, pulse code modulated signal synchronizer  
 JSC-12462 873-10107 02

Two-carrier command modulation system  
 NPO-11548 873-10273 02  
 High speed direct-binary to binary-coded-decimal converter and scaler  
 KSC-10326 873-10281 02  
 Single-channel digital command-detection system  
 NPO-11302 873-10342 02  
 Automatic PCM guard-band selector and calibrator  
 KSC-10812 873-10510 02

**PULSE DURATION**

Pulse stretcher for narrow pulses  
 JSC-14130 873-10365 02

**PULSE DURATION MODULATION**

Isolated output for class-D dc amplifiers  
 M-FS-21616 873-10331 02

**PULSE GENERATORS**

Programmable random interval generator  
 JSC-14131 873-10367 02  
 A high-speed spectrograph shutter  
 HQ-10635 873-10368 01  
 Alphanumeric character generator for oscilloscope  
 GSFC-11582 873-10370 02

**PULSED LASERS**

Vibration measurement by pulse differential holographic interferometry  
 LANGLEY-11092 873-10075 03  
 Laser system detects air turbulence  
 M-FS-21244 873-10210 03

**PUMPING**

Pressure drop and pumping power for fluid flow through round tubes  
 M-FS-24172 873-10186 09

**Q**

**Q SWITCHED LASERS**

Q-switched, cavity-dumped, mode-locked laser  
 GSFC-11509 873-10175 03  
 Fast recharge circuit for q-switched lasers  
 GSFC-11510 873-10257 02

**QUADRUPOLES**

Ion masking improves resolution in quadrupole mass spectrometers  
 GSFC-11406 873-10181 03

**QUALITATIVE ANALYSIS**

TLC determination of functionality in prepolymers  
 NPO-11731 873-10037 04

**QUALITY CONTROL**

Manufacture and quality control of interconnecting wire harnesses  
 M-FS-22511 873-10211 01  
 Bonded panel, flaw detection standards  
 LANGLEY-11399 873-10240 06

**QUARTZ**

Process for the production of star-tracking reticles  
 GSFC-11188 873-10488 03

**R**

**RADAR**

Improved 135.6-MHz antenna  
 ARC-10743 873-10500 02

**RADAR ANTENNAS**

Lightweight inflatable material with low permeability  
 LANGLEY-10928 873-10400 04

**RADAR BEACONS**

Scanning beacon locator system: A concept  
 JSC-12593 873-10318 02

**RADIATION COUNTERS**

Particulate and aerosol detector  
 LANGLEY-11434 873-10357 04

**RADIATION DETECTORS**

Portable light detection system for the blind  
 M-FS-22403 873-10099 05  
 Cosmic dust or other similar outer-space particles location detector  
 GSFC-11291 873-10282 02  
 Binary-selectable detector holdoff circuit  
 M-FS-22898 873-10487 02

**RADIATION DISTRIBUTION**

Means for mapping radiated fields and for measuring differential movement of antenna elements  
 NPO-13053 873-10452 02

**RADIATION EFFECTS**

Reductive cleavage of the peptide bond  
 LRL-10026 873-10194 04  
 Multilayer flat electrical cable  
 ARC-10734 873-10264 01

**RADIATION HAZARDS**

Safety monitoring system for radio-isotope thermoelectric generators  
 NPO-13285 873-10352 02

**RADIO EQUIPMENT**

High-power microstrip switch  
 NPO-11965 873-10451 02

**RADIO FREQUENCIES**

A proposed adjustable RF cable connector  
 M-FS-24271 873-10097 01  
 RF to digital converter  
 JSC-14419 873-10306 02  
 Nomograph for prediction of RF-breakdown voltages  
 NPO-11819 873-10386 01  
 Meter circuit for tuning RF amplifiers  
 NPO-11865 873-10389 02  
 RF antenna-pattern visual aids for field use  
 KSC-10821 873-10428 02  
 RF shielded connectors  
 GSFC-11215 873-10509 01  
 Design method for minimizing RF voltage breakdown  
 NPO-13408 873-10520 01

**RADIOACTIVE DECAY**

PPUAS--photopeak unfolding and self-shielding program  
 NPO-13188 873-10087 09

**RADIOACTIVE ISOTOPES**

Safety monitoring system for radio-isotope thermoelectric generators  
 NPO-13285 873-10352 02  
 Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
 M-FS-22678 873-10518 06

**RADIOACTIVITY**

Improved format for radiocardiographic data  
 ARC-10742 873-10270 05  
 Computer system for monitoring radio-respirometry data  
 ARC-10784 873-10494 06

- RADIOBIOLOGY**  
Improved format for radiocardiographic data  
ARC-10742 B73-10270 05  
Computer system for monitoring radiorespirometry data  
ARC-10784 B73-10494 05
- RADIOCHEMISTRY**  
Radiochemical synthesis of pure anhydrous metal halides  
LEWIS-11880 B73-10407 04
- RADIOGRAPHY**  
Video-enhancement of X-ray and neutron radiographs  
LEWIS-11944 B73-10009 03  
Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 B73-10027 03  
Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22878 B73-10518 06  
X-ray opaque additive for inspection of weld joints  
M-FS-22896 B73-10528 08
- RADIOMETERS**  
High-temperature-radiation analyzer  
ARC-10565 B73-10017 03  
Optical detection of oil on water  
ARC-10649 B73-10268 03  
Wide-field reflective scanning optical systems  
JSC-14096 B73-10279 03  
Improved noise-adding radiometer for microwave receivers  
NPO-11706 B73-10345 02
- RAMAN LASERS**  
Atmospheric temperature measurements by Raman laser scattering  
LEWIS-12085 B73-10251 03
- RAMAN SPECTRA**  
Atmospheric temperature measurements by Raman laser scattering  
LEWIS-12065 B73-10251 03
- RAMS (PRESSES)**  
Apparatus for measuring electrical properties of materials  
NPO-11749 B73-10025 03
- RANDOM LOADS**  
Probability of stress-corrosion fracture under random loading  
NPO-13113 B73-10453 04
- RANDOM NUMBERS**  
Digital random-number generator  
ARC-10096 B73-10266 09
- RANDOM PROCESSES**  
Programmable random interval generator  
JSC-14131 B73-10367 02
- RANGE FINDERS**  
Junction range finder  
KSC-10108 B73-10191 02
- RANGEFINDING**  
Code-regenerative clean-up loop for a ranging transponder  
NPO-11707 B73-10141 02  
Junction range finder  
KSC-10108 B73-10191 02
- RAYLEIGH-RITZ METHOD**  
Improved procedures for mass matrix-reductions in eigenvalue solutions  
NPO-11619 B73-10384 09
- RC CIRCUITS**  
Operational slope-limiting circuit  
NPO-11773 B73-10346 01  
Ankylosis-stabilized oscillator  
GSFC-11513 B73-10392 02
- Low-cost clearance indicator for high speed turbomachinery  
LEWIS-12128 B73-10411 02
- RECORDING HEADS**  
Image data rate converter: A concept  
NPO-11659 B73-10277 02  
Subminiature micropower digital recorder  
ARC-10746 B73-10491 02
- RECORDING INSTRUMENTS**  
A remote test parameter profile display  
LEWIS-11872 B73-10006 02  
Bipotential monitoring with inexpensive office-type cassette recorders  
M-FS-22566 B73-10167 02  
Hologram recording tubes  
M-FS-22590 B73-10330 03
- REDUCTION (CHEMISTRY)**  
Reductive cleavage of the peptide bond  
LRL-10026 B73-10194 04
- REDUNDANCY**  
Satellite auxiliary propulsion systems  
NPO-11744 B73-10023 06  
A method for economic evaluation of redundancy levels for aerospace systems  
KSC-10754 B73-10067 09  
Redundant screwjack  
JSC-19200 B73-10070 07
- REFLECTANCE**  
Optical monitoring system  
M-FS-21692 B73-10050 03  
Integrating-sphere coating  
GSFC-11214 B73-10403 04
- REFRACTIVITY**  
Method for estimating solubility parameter  
NPO-11647 B73-10022 04
- REFRACTORY MATERIALS**  
Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08  
Polyimide fiber-glass composite resists high temperatures  
ARC-10782 B73-10505 04
- REFRACTORY METAL ALLOYS**  
Braze alloys for high temperature service  
LEWIS-11374 B73-10205 06
- REFRACTORY METALS**  
Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08
- REFRIGERATING MACHINERY**  
Monel-shot and screen regenerators  
GSFC-11593 B73-10462 03
- REGENERATIVE COOLING**  
Monel-shot and screen regenerators  
GSFC-11593 B73-10462 03
- REGENERATORS**  
Monel-shot and screen regenerators  
GSFC-11593 B73-10462 03
- REINFORCED PLASTICS**  
Production of circular polymer-glass fabric composites  
M-FS-22125 B73-10069 04  
Preparation of prepreg graphite tape with insoluble polymer  
JSC-14313 B73-10084 04  
Millimeter-wave antenna system  
GSFC-10949 B73-10333 01
- REINFORCING FIBERS**  
Technique for the polymerization of monomers for PPQ/graphite fiber composites  
LEWIS-11879 B73-10014 04
- An inexpensive and effective method for calculating the strength of randomly reinforced fiber composites  
LEWIS-11985 B73-10039 04
- RELAY SATELLITES**  
Scanning beacon locator system: A concept  
JSC-12593 B73-10318 02
- RELIABILITY**  
A method for economic evaluation of redundancy levels for aerospace systems  
KSC-10754 B73-10067 09  
Redundant screwjack  
JSC-19200 B73-10070 07
- RELIABILITY ANALYSIS**  
A new algorithm for finding survival coefficients employed in reliability equations  
M-FS-22295 B73-10256 09  
Optimization of structures on the basis of fracture mechanics and reliability criteria  
NPO-11645 B73-10276 06
- RELIABILITY ENGINEERING**  
Satellite auxiliary propulsion systems  
NPO-11744 B73-10023 06
- RELIEF VALVES**  
Thermally actuated valve  
NPO-11846 B73-10347 06
- REMOTE CONTROL**  
A proposed hand-tool assembly for robots  
M-FS-22266 B73-10216 07  
Logic controlled solid state switchgear  
LEWIS-12044 B73-10408 02  
An automated remote marshland water-sampling station  
LANGLEY-11503 B73-10437 04  
Eye-controlled "teletypewriter"  
LANGLEY-11584 B73-10514 02
- REMOTE HANDLING**  
Advanced action manipulator system (ADAMS)  
M-FS-22022 B73-10204 07  
A proposed hand-tool assembly for robots  
M-FS-22266 B73-10216 07
- REMOTE SENSORS**  
Remote measurements by telephone  
LEWIS-11704 B73-10010 02  
Limited tactile stimulus for prosthetic hands  
M-FS-16570 B73-10078 05  
Dye laser remote sensing of marine plankton  
LANGLEY-11382 B73-10359 05  
Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 B73-10417 03
- REMOVAL**  
Condensate-removal device for heat exchangers  
JSC-14143 B73-10429 06  
Tool for installing or extracting small bulbs in limited-access spaces  
LANGLEY-11543 B73-10433 07
- RESCUE OPERATIONS**  
Scanning beacon locator system: A concept  
JSC-12593 B73-10318 02
- RESEARCH MANAGEMENT**  
GREMEX update (Goddard research engineering management exercise)  
GSFC-11512 B73-10162 09

**RESIDUAL STRESS**

Residual stress effects on the impact resistance and strength of fiber composites

LEWIS-11984 873-10063 04

**RESINS**

Self-sterilizing polymers

M-FS-22054 873-10090 04

**RESISTANCE HEATING**

Positive contact resistance soldering unit

KSC-10242 873-10145 02

**RESOLVERS**

Four-phase differential phase shift resolver

JSC-14065 873-10093 02

**RESONANT FREQUENCIES**

Improved procedures for mass matrix-reductions in eigenvalue solutions

NPO-11619 873-10384 09

Flaw detection by mechanical resonant measurement

M-FS-19218 873-10440 03

Frequencies and modes for shells of revolution (FAMSOR)

JSC-14497 873-10444 09

**RESONANT VIBRATION**

Flaw detection by mechanical resonant measurement

M-FS-19218 873-10440 03

**RESONATORS**

Ultrasonic calibration device

LANGLEY-11435 873-10420 03

**RESPIRATORY PHYSIOLOGY**

Computer system for monitoring radio-respirometry data

ARC-10784 873-10494 05

**RESTORATION**

Recovery of recordings from heat damaged magnetic tapes

JSC-14219 873-10173 02

**RETICLES**

Process for the production of star-tracking reticles

GSFC-11188 873-10488 03

**REVOLVING**

Dynamic nonlinear analysis of shells of revolution (DYNASOR II)

JSC-14496 873-10443 09

Frequencies and modes for shells of revolution (FAMSOR)

JSC-14497 873-10444 09

Stiffness and mass matrices for shells of revolution (SAMMSOR II)

JSC-14494 873-10446 09

**RIBBONS**

A spiraled niobium tin superconductive ribbon

LEWIS-11726 873-10044 04

**RING STRUCTURES**

Computer program for transient response of structural rings subjected to fragment impact

LEWIS-11926 873-10064 09

**RIVETING**

Fatigue of boron-aluminum composites bonds and joints

M-FS-22325 873-10079 04

**RIVETS**

Metallic composites as high-temperature fasteners

M-FS-22438 873-10081 04

**ROBOTS**

A proposed hand-tool assembly for robots

M-FS-22266 873-10216 07

**ROCKET EXHAUST**

Rocket plume properties measured in space simulators

NPO-11608 873-10137 03

**ROCKET PROPELLANTS**

Mass flow controller for gaseous propellants

JSC-14221 873-10207 06

**ROCKET-BORNE INSTRUMENTS**

Rocket borne instrument to measure electric fields inside electrified clouds

KSC-10730 873-10176 03

**ROLL FORMING**

Improved diffusion welding and roll welding of titanium alloys

LEWIS-11852 873-10005 08

Densification of powder metallurgy billets by a roll consolidation technique

LEWIS-11395 873-10040 08

**ROLLER BEARINGS**

Carbide factor predicts rolling-element bearing fatigue life

LEWIS-11940 873-10008 07

**ROOTS OF EQUATIONS**

Computer program to determine roots of polynomials by ratio of successive derivatives

LEWIS-11809 873-10244 09

**ROTATING DISKS**

Automated Shell Theory for Rotating Structures (ASTROS)

M-FS-21970 873-10115 09

**ROTATING MIRRORS**

Wide-field reflective scanning optical systems

JSC-14096 873-10278 03

**ROTATING SHAFTS**

New motor shaft angular accelerometer concept

LANGLEY-11030 873-10119 02

Mechanical planetary compensating drive system

ARC-10462 873-10497 06

**ROTOR AERODYNAMICS**

Method for predicting rotor free-wake positions and the resulting rotor blade airloads

LANGLEY-10674 873-10239 06

**ROTORS**

An electric motor with magnetic bearings: A concept

XGS-07805 873-10304 01

**ROVING VEHICLES**

Articulated elastic-loop roving vehicles

M-FS-22691 873-10326 06

**RUBBER**

Rubber composition compatible with hydrazine

NPO-11440 873-10019 04

**RUBBER COATINGS**

Nonflammable potting-encapsulating and conformal coating compounds

JSC-14164 873-10102 04

**RUBY**

Eutectic bonding of sapphire to sapphire

GSFC-11577 873-10284 08

Improved masers for X-band and Ku band

NPO-11437 873-10293 02

**RUBY LASERS**

LEAPS (Laser electro-optical alignment pole for surveying)

GSFC-11262 873-10122 02

Laser energy converted into electric power

NPO-13308 873-10353 02

**S****SAFETY**

Integral aircraft passenger seat

ARC-10799 873-10495 05

**SAFETY DEVICES**

Brake wear warning device: A concept

JSC-19157 873-10123 02

Electroshock protection circuit

JSC-14222 873-10261 02

Pressurized lighting system

KSC-10644 873-10280 02

Thermally actuated valve

NPO-11846 873-10347 06

Safe electrical receptacle and modified plug

KSC-10817 873-10366 01

**SAMARIUM**

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes

LEWIS-11610 873-10206 03

**SAMPLERS**

An automated remote marshland water-sampling station

LANGLEY-11503 873-10437 04

**SAMPLING**

Flexible format, computer accessed telemetry system

NPO-11358 873-10290 02

Gas chromatography of volatile organic compounds

JSC-14428 873-10406 04

An automated remote marshland water-sampling station

LANGLEY-11503 873-10437 04

Biodection grinder

M-FS-22833 873-10474 05

**SANDWICH STRUCTURES**

Lightweight graphite/polyimide panels

JSC-14375 873-10121 04

Manufacture of large, lightweight parabolic antennas

ARC-10741 873-10375 08

Strain arrestor plate for mounting rigid insulating tiles

JSC-14182 873-10465 06

**SAPPHIRE**

Eutectic bonding of sapphire to sapphire

GSFC-11577 873-10284 08

Silicon on sapphire for ion implantation studies

LANGLEY-11415 873-10522 04

**SATELLITE ORIENTATION**

Solar aspect determination system

GSFC-11444 873-10129 02

**SATURN 5 LAUNCH VEHICLES**

Welding high-strength aluminum alloys

M-FS-22918 873-10481 04

**SCALE MODELS**

Thermal-dynamic modeling study

LANGLEY-11309 873-10076 06

**SCALING LAWS**

Thermal-dynamic modeling study

LANGLEY-11309 873-10076 06

**SCATTERING CROSS SECTIONS**

Measurement of X-ray scattering by optical surfaces

GSFC-11590 873-10283 03

**SCRAP**

Ferrofluid separator for nonferrous scrap separation

LANGLEY-11523 873-10463 07

- SCREWS**  
Redundant screwjack  
JSC-19200 B73-10070 07
- SEALERS**  
Vacuum-stripped silicone binder for thermal-control paint  
M-FS-21397 B73-10060 04  
A new intermediate for the production of flexible stable polymers  
M-FS-22355 B73-10080 04
- SEALS (STOPPERS)**  
Low-closing-force seal  
ARC-10775 B73-10380 06  
Poppet valve tester  
LEWIS-11655 B73-10415 07  
Container seal for dusty environment  
LANGLEY-10962 B73-10416 07
- SEATS**  
Integral aircraft passenger seat  
ARC-10799 B73-10495 05
- SEEBECK EFFECT**  
Apparatus for measuring electrical properties of materials  
NPO-11749 B73-10025 03
- SELECTORS**  
Automatic PCM guard-band selector and calibrator  
KSC-10812 B73-10510 02
- SELENIUM COMPOUNDS**  
Vapor phase growth of group 3, 4, and 5 compounds by HCl transport of elements  
LANGLEY-11144 B73-10056 04
- SELF ADAPTIVE CONTROL SYSTEMS**  
Fuel-cell heat and mass plate  
M-FS-21318 B73-10489 07
- SELF ALIGNMENT**  
Self-adjusting assembly jig  
LEWIS-12034 B73-10250 07
- SEMICONDUCTOR DEVICES**  
Glass encapsulation provides extra protection for IC semiconductor devices  
M-FS-21310 B73-10054 01  
Thin film thermoelectric devices as thermal control coatings: A study  
M-FS-21384 B73-10153 04  
An improved method for obtaining a normalized junction temperature for semiconductors: A concept  
JSC-14136 B73-10196 01  
Laser scanner for testing semiconductor chips  
M-FS-22693 B73-10327 02  
Welded printed circuit (pc) stick  
GSFC-11773 B73-10393 01
- SEMICONDUCTORS (MATERIALS)**  
Hermetic-coaxial package design for microwave transistors  
GSFC-10791 B73-10427 01
- SENSITIVITY**  
Method of predicting ionization-type vacuum gage sensitivity for various gases  
LEWIS-12056 B73-10409 03
- SEPARATORS**  
Electrophoresis separator combining centrifugal separation  
M-FS-21396 B73-10328 04  
Procedure for dispersing fiber bundles  
LANGLEY-11224 B73-10438 08  
Ferrofluid separator for nonferrous scrap separation  
LANGLEY-11523 B73-10463 07
- SEQUENTIAL CONTROL**  
Sequential-strip and sequential-disk filters  
JSC-14592 B73-10430 06
- SERIES (MATHEMATICS)**  
Use of multivariable asymptotic expansions in a satellite theory  
NPO-11750 B73-10303 09
- SERVICES**  
Logistics hardware and services control system  
KSC-10819 B73-10418 09
- SERVOCONTROL**  
New motor shaft angular accelerometer concept  
LANGLEY-11030 B73-10119 02  
Automatic quadrature control and measuring system  
M-FS-21660 B73-10127 02  
Advanced action manipulator system (ADAMS)  
M-FS-22022 B73-10204 07  
Digital servo control of random sound fields  
NPO-11623 B73-10297 02  
Digital servo controller behaves like synchro  
KSC-10769 B73-10337 02
- SERVOMECHANISMS**  
Linear kinematic air bearing  
NPO-13151 B73-10456 06
- SERVOMOTORS**  
New motor shaft angular accelerometer concept  
LANGLEY-11030 B73-10119 02
- SHAFTS (MACHINE ELEMENTS)**  
Mechanical planetary compensating drive system  
ARC-10462 B73-10497 06
- SHAKERS**  
Dynamic testing of complex structures  
JSC-12569 B73-10057 06  
A multidegree-of-freedom vibrational apparatus  
GSFC-11302 B73-10332 06
- SHEAR STRESS**  
Residual stress effects on the impact resistance and strength of fiber composites  
LEWIS-11984 B73-10063 04  
A flexible all-temperature pressure vessel  
M-FS-19196 B73-10158 03
- SHELL STABILITY**  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09
- SHELL THEORY**  
Automated Shell Theory for Rotating Structures (ASTROS)  
M-FS-21970 B73-10115 09
- SHELLS (STRUCTURAL FORMS)**  
Dynamic nonlinear analysis of shells of revolution (DYNASOR II)  
JSC-14496 B73-10443 09  
Frequencies and modes for shells of revolution (FAMSOR)  
JSC-14497 B73-10444 09  
The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 B73-10445 09  
Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
JSC-14494 B73-10446 09
- SHIFT REGISTERS**  
Minimal hardware, binary sequence pseudonoise generator and detector  
NPO-11406 B73-10292 01
- SHOCK ABSORBERS**  
Emergency-escape device  
M-FS-22720 B73-10369 07
- SHOCK TUBES**  
High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03
- SHORT TAKEOFF AIRCRAFT**  
Radial honeycomb core  
ARC-10727 B73-10340 08
- SHROUDS**  
Low-cost clearance indicator for high speed turbomachinery  
LEWIS-12128 B73-10411 02
- SIGNAL ANALYZERS**  
Peak-holding circuit for extremely narrow pulses  
JSC-14129 B73-10317 02  
Pulse stretcher for narrow pulses  
JSC-14130 B73-10365 02
- SIGNAL DETECTION**  
All-digital phase-lock loops for noise-free signals  
NPO-11914 B73-10350 01
- SIGNAL GENERATORS**  
Signal conditioner for potentiometer type transducers  
LEWIS-11822 B73-10015 01  
Signal conditioner test set  
KSC-10750 B73-10189 02
- SIGNAL PROCESSING**  
Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
M-FS-24424 B73-10325 06  
All-digital phase-lock loops for noise-free signals  
NPO-11914 B73-10350 01
- SIGNAL STABILIZATION**  
A technique to eliminate false lock in PCM demodulation  
JSC-12494 B73-10106 02  
Phase shift keyed, pulse code modulated signal synchronizer  
JSC-12462 B73-10107 02
- SIGNAL TO NOISE RATIOS**  
Data-aided carrier tracking loops  
NPO-11282 B73-10356 01  
Television noise-reduction device  
JSC-12607 B73-10431 02
- SIGNAL TRANSMISSION**  
Isolated transfer of analog signals  
LANGLEY-11312 B73-10513 02
- SILICATES**  
Microwave emission from granular silicates  
NPO-11702 B73-10140 03
- SILICON**  
Silicon-fiber blanket solar-cell array concept  
M-FS-22458 B73-10374 01  
Silicon on sapphire for ion implantation studies  
LANGLEY-11415 B73-10522 04
- SILICON CONTROLLED RECTIFIERS**  
Impulse commutating circuit with transformer to limit reapplied voltage  
LEWIS-11849 B73-10004 01  
Compact 20-kiloampere pulse-forming-network capacitor bank  
LEWIS-12009 B73-10171 01  
SRC seal testing  
M-FS-22426 B73-10199 01
- SILICON DIOXIDE**  
Rubber composition compatible with hydrazine  
NPO-11440 B73-10019 04

- Strain arrestor plate for mounting rigid insulating tiles  
 JSC-14182 873-10465 06  
 Reusable silica surface-insulation material  
 ARC-10721 873-10504 04
- SILICON TRANSISTORS**  
 P-channel silicone gate FET  
 M-FS-22505 873-10197 01  
 Silicon switching transistor with high power and low saturation voltage  
 NPO-11565 873-10295 01
- SILICONE RESINS**  
 Improved mold release for filled-silicone compounds  
 JSC-19300 873-10338 04  
 Adhesive coating eliminated in new honeycomb-core fabrication process  
 LANGLEY-11134 873-10439 08  
 RF shielded connectors  
 GSFC-11215 873-10509 01
- SILICONE RUBBER**  
 Vacuum-stripped silicone binder for thermal-control paint  
 M-FS-21397 873-10060 04  
 Nonflammable potting-encapsulating and conformal coating compounds  
 JSC-14184 873-10102 04  
 Thermally responsive mechanical actuator  
 GSFC-11697 873-10208 04  
 Elastic light-scattering modulator: A concept  
 M-FS-22724 873-10422 03  
 Strain arrestor plate for mounting rigid insulating tiles  
 JSC-14182 873-10465 06
- SILICONES**  
 Evaluation of thermal insulation materials  
 NPO-11586 873-10020 04  
 Method for casting polyethylene pipe  
 ARC-10706 873-10032 08  
 Apparatus for cutting elastomeric materials  
 NPO-13146 873-10521 07
- SILK**  
 Effects of environmental exposure on cryogenic thermal insulation materials  
 LEWIS-12007 873-10213 04
- SILVER**  
 A new method for the determination of thin film porosity  
 HQ-10673 873-10286 01
- SILVER ALLOYS**  
 Stable palladium alloys for diffusion of hydrogen  
 NPO-11747 873-10024 04
- SILVER CHLORIDES**  
 Application of biological filters in water treatment systems  
 JSC-14226 873-10404 05
- SILVER ZINC BATTERIES**  
 Rechargeable silver-zinc battery conditioner/monitor unit and state-of-charge indicator  
 M-FS-22835 873-10486 02
- SIMULATORS**  
 Dynamic power load simulator  
 JSC-14285 873-10305 02
- SINGLE CRYSTALS**  
 Single crystal tubes of beta alumina  
 LEWIS-11844 873-10316 04
- SIZE DETERMINATION**  
 Electro-optical device for monitoring wire size  
 LANGLEY-11358 873-10321 02
- SLIDING CONTACT**  
 Liquid metal porous matrix sliding electrical contact: A concept  
 LEWIS-11735 873-10184 01
- SMOG**  
 Smoke generator  
 LANGLEY-11433 873-10414 06
- SMOKE**  
 Smoke generator  
 LANGLEY-11433 873-10414 06
- SODIUM CHLORIDES**  
 Integrating-sphere coating  
 GSFC-11214 873-10403 04
- SODIUM COMPOUNDS**  
 Single crystal tubes of beta alumina  
 LEWIS-11844 873-10316 04
- SOIL SCIENCE**  
 Soil moisture by extraction and gas chromatography  
 ARC-10748 873-10503 04
- SOILS**  
 Soil moisture by extraction and gas chromatography  
 ARC-10748 873-10503 04
- SOLAR CELLS**  
 Silicon-fiber blanket solar-cell array concept  
 M-FS-22458 873-10374 01
- SOLAR COLLECTORS**  
 Solar-energy absorber: Active infrared (IR) trap  
 M-FS-22743 873-10484 06  
 Solar-energy absorber: Active infrared (IR) trap without glass  
 M-FS-22744 873-10485 06  
 Selective coating for collecting solar energy on aluminum  
 M-FS-22562 873-10527 04
- SOLAR ENERGY**  
 Proposed electromagnetic wave energy converter  
 GSFC-11394 873-10185 01  
 Metal tube used as solar engine  
 ARC-10461 873-10493 03  
 Solar-energy conversion system provides electrical power and thermal control for life-support systems  
 M-FS-21528 873-10524 06  
 Selective coating for collecting solar energy on aluminum  
 M-FS-22562 873-10527 04
- SOLAR ENERGY ABSORBERS**  
 Solar-energy absorber: Active infrared (IR) trap  
 M-FS-22743 873-10484 06  
 Solar-energy absorber: Active infrared (IR) trap without glass  
 M-FS-22744 873-10485 06
- SOLAR HEATING**  
 A practical solar energy heating and cooling system  
 M-FS-22563 873-10156 05  
 Balloon-borne package temperature controller  
 GSFC-11620 873-10192 03  
 Structural heat pipe  
 GSFC-11619 873-10364 06
- SOLAR REFLECTORS**  
 Refractory porcelain enamel passive-thermal-control coating for high-temperature superalloys  
 M-FS-22324 873-10215 04
- SOLAR SENSORS**  
 Solar aspect determination system  
 GSFC-11444 873-10129 02
- Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
 NPO-13051 873-10480 02
- SOLDERING**  
 Positive contact resistance soldering unit  
 KSC-10242 873-10145 02
- SOLENOID VALVES**  
 Magnetic latching valve  
 NPO-11790 873-10026 06
- SOLID LUBRICANTS**  
 Lubrication handbook  
 M-FS-22326 873-10062 04
- SOLID PROPELLANT ROCKET ENGINES**  
 Structural analysis of viscoelastic materials under thermal and pressure loading  
 NPO-11727 873-10301 09
- SOLID PROPELLANTS**  
 Monitor for physical property changes in solid propellants  
 ARC-10702 873-10130 03
- SOLID STATE DEVICES**  
 Impulse commutating circuit with transformer to limit reappplied voltage  
 LEWIS-11849 873-10004 01  
 Automatic quadrature control and measuring system  
 M-FS-21660 873-10127 02  
 Solar aspect determination system  
 GSFC-11444 873-10129 02  
 Light-direction sensor based on birefringency  
 NPO-11201 873-10131 03  
 Signal conditioner test set  
 KSC-10750 873-10189 02  
 Reliable low-cost battery voltage indicator for light aircraft and automobiles  
 LEWIS-12020 873-10249 01  
 Fast recharge circuit for q-switched lasers  
 GSFC-11510 873-10257 02  
 Frequency shifting with a solid-state switching capacitor  
 HQ-10812 873-10259 01  
 Logic controlled solid state switchgear  
 LEWIS-12044 873-10408 02  
 Solid-state controller  
 JSC-12394 873-10466 06
- SOLID-SOLID INTERFACES**  
 Fiber composite materials: A survey of fiber matrix interface mechanics  
 LEWIS-11924 873-10007 04  
 Thermal contact resistance in a non-ideal joint  
 M-FS-21775 873-10105 03
- SOLIDS**  
 Long-term material compatibility testing system  
 NPO-11776 873-10385 04
- SOLUBILITY**  
 Method for estimating solubility parameter  
 NPO-11647 873-10022 04
- SOLVENT EXTRACTION**  
 Soil moisture by extraction and gas chromatography  
 ARC-10748 873-10503 04
- SORBENTS**  
 Estimating sorber capacity for multiple contaminants  
 LANGLEY-11056 873-10424 04
- SOUND FIELDS**  
 Digital servo control of random sound fields  
 NPO-11623 873-10297 02

**SOUND TRANSDUCERS**

- Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
M-FS-24424 B73-10325 06
- Porous surface microphone for measuring acoustic signals in turbulent windstreams  
ARC-10776 B73-10490 03

**SOUND WAVES**

- Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 B73-10212 03
- Gated compressor, distortionless signal limiter  
NPO-11820 B73-10387 01
- Porous surface microphone for measuring acoustic signals in turbulent windstreams  
ARC-10776 B73-10490 03

**SPACE EXPLORATION**

- Microwave emission from granular silicates  
NPO-11702 B73-10140 03

**SPACE SHUTTLES**

- Shuttle orbiter storage locker system: A study  
JSC-14448 B73-10287 08

**SPACE SIMULATORS**

- Rocket plume properties measured in space simulators  
NPO-11608 B73-10137 03

**SPACE STORAGE**

- Shuttle orbiter storage locker system: A study  
JSC-14448 B73-10287 08

**SPACEBORNE TELESCOPES**

- Fine guidance for a spaceborne telescope  
GSFC-11487 B73-10468 03

**SPACECRAFT CABINS**

- Leak detector-measurer  
M-FS-21761 B73-10203 07

**SPACECRAFT COMMUNICATION**

- High-sensitivity receiver for CO2 laser communications  
GSFC-11455 B73-10223 02
- Extended range harmonic filter  
LEWIS-12064 B73-10313 02
- Automatic carrier acquisition system for phase-lock-loop receivers  
NPO-11628 B73-10343 02
- High-power microstrip switch  
NPO-11965 B73-10451 02

**SPACECRAFT CONTROL**

- Ascent control analysis for S-II derivative launch vehicles, digital computer program  
M-FS-24324 B73-10120 09
- Solar aspect determination system  
GSFC-11444 B73-10129 02
- Hybrid coordinate formulation used for the design of attitude control systems for flexible spacecraft  
NPO-11714 B73-10300 09
- Combined sun-acquisition and sun gate-sensor system for spacecraft attitude control  
NPO-13051 B73-10460 02

**SPACECRAFT GUIDANCE**

- Process for the production of star-tracking reticles  
GSFC-11188 B73-10488 03

**SPACECRAFT MANEUVERS**

- A general purpose maneuver turns computer program  
NPO-13213 B73-10088 09

**SPACECRAFT POWER SUPPLIES**

- Design and material selection for inverter transformer cores  
NPO-11726 B73-10142 04

**SPACECRAFT STABILITY**

- Improved syncom-type fluid damper  
GSFC-11205 B73-10478 06

**SPACECRAFT TRACKING**

- Fine guidance for a spaceborne telescope  
GSFC-11487 B73-10468 03

**SPACECRAFT TRAJECTORIES**

- N-body U and K matrix program  
LEWIS-11438 B73-10012 09
- Use of multivariable asymptotic expansions in a satellite theory  
NPO-11750 B73-10303 09

**SPARE PARTS**

- Logistics hardware and services control system  
KSC-10819 B73-10418 09

**SPATIAL DISTRIBUTION**

- High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03

**SPECIFIC HEAT**

- Fluidic device for measuring constituent masses of a flowing binary gas mixture  
LEWIS-11995 B73-10230 06
- New method for determining thermo-physical properties of test specimens  
LANGLEY-11053 B73-10447 04

**SPECIFICATIONS**

- Handbook of cleaning requirements, procedures, and verification techniques for oxygen systems  
LEWIS-11963 B73-10188 04

**SPECIMENS**

- Biodetection grinder  
M-FS-22833 B73-10474 05

**SPECTROMETERS**

- Programmable random interval generator  
JSC-14131 B73-10367 02
- A high-speed spectrograph shutter  
HQ-10635 B73-10368 01
- High-speed spectrograph for shock tube studies  
ARC-10772 B73-10501 03

**SPECTORADIOMETERS**

- Wide-field reflective scanning optical systems  
JSC-14096 B73-10279 03

**SPECTROSCOPY**

- A new method for the determination of thin film porosity  
HQ-10673 B73-10286 01
- Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10516 03

**SPECTRUM ANALYSIS**

- Spectral analysis program (SAP)  
JSC-14310 B73-10227 09
- RF to digital converter  
JSC-14419 B73-10306 02

**SPEED CONTROL**

- Automatic speed control of highway traffic  
M-FS-21791 B73-10100 02
- Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
M-FS-22088 B73-10525 02

**SPEED INDICATORS**

- An inexpensive vehicle speed detector  
M-FS-22601 B73-10157 02

- Small portable speed calculator  
M-FS-22638 B73-10329 07

**SPEED REGULATORS**

- Automatic speed control of highway traffic  
M-FS-21791 B73-10100 02

**SPERMATOZOA**

- Reproductive cell separation: A concept  
M-FS-22627 B73-10198 05

**SPHERICAL SHELLS**

- Integrating-sphere coating  
GSFC-11214 B73-10403 04

**SPIN STABILIZATION**

- Improved syncom-type fluid damper  
GSFC-11205 B73-10478 06

**SPINE**

- Mathematical model for predicting human vertebral fracture  
ARC-10691 B73-10033 05

**SPIRAL WRAPPING**

- A spiraled niobium tin superconductive ribbon  
LEWIS-11726 B73-10044 04

**SPONTANEOUS COMBUSTION**

- Autoignition test cell with flexible atmosphere control  
KSC-10198 B73-10113 04

**SPOT WELDS**

- Resistance spot welding of dispersion-strengthened nickel alloys  
LEWIS-12075 B73-10315 04

**SPRAYED COATINGS**

- Integrating-sphere coating  
GSFC-11214 B73-10403 04

**STAINLESS STEELS**

- Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08
- Materials data handbooks on stainless steels  
M-FS-22797 B73-10397 04
- Backflushing system rapidly cleans fluid filters  
JSC-14273 B73-10405 06

**STAR TRACKERS**

- Process for the production of star-tracking reticles  
GSFC-11188 B73-10488 03

**STATIC INVERTERS**

- Design and material selection for inverter transformer cores  
NPO-11726 B73-10142 04

**STATIC LOADS**

- The static nonlinear analysis of shells of revolution (SNASOR II)  
JSC-14495 B73-10445 09

**STATISTICAL ANALYSIS**

- Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 B73-10212 03
- Validity test for linear error analysis  
JSC-14378 B73-10219 09

**STATISTICAL DISTRIBUTIONS**

- A comprehensive program for textual concordances and statistics  
JSC-17484 B73-10049 09
- Digital random-number generator  
ARC-10096 B73-10266 09

**STEELS**

- Emergency-escape device  
M-FS-22720 B73-10369 07

**STEREOSCOPIC VISION**

- Stereoscopic computer graphics display system  
M-FS-22322 B73-10526 09

- STEREOTELEVISION**  
Stereoscopic television system  
ARC-10160 B73-10499 02
- STERILIZATION**  
Self-sterilizing polymers  
M-FS-22054 B73-10090 04
- STIFFNESS**  
Stiffness and mass matrices for shells of revolution (SAMMSOR II)  
JSC-14494 B73-10446 09
- STIMULATED EMISSION**  
Q-switched, cavity-dumped, mode-locked laser  
GSFC-11509 B73-10175 03
- STIRRING**  
Bimetallic devices for stirring fluids  
ARC-10441 B73-10029 06  
Self-powered mixer for pressurized containers  
LEWIS-12054 B73-10312 03
- STORAGE**  
A new optical recording medium  
M-FS-22348 B73-10095 03
- STORAGE BATTERIES**  
An ampere-hour meter for batteries  
M-FS-22067 B73-10118 02
- STORAGE TANKS**  
Filament winding technique produces strong lightweight oxygen tanks  
M-FS-22470 B73-10082 08  
Self-powered mixer for pressurized containers  
LEWIS-12054 B73-10312 03
- STRAIN GAGES**  
A self-supporting strain transducer  
LANGLEY-11263 B73-10201 06  
High-temperature gas/liquid stress relaxometers  
NPO-13168 B73-10457 04
- STRAPS**  
Flat-band assembly for toroidal transformer cores  
NPO-11966 B73-10391 08
- STRESS ANALYSIS**  
Holographic testing with a double reference beam  
JSC-17959 B73-10086 03  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09  
Isogrid design handbook  
M-FS-22686 B73-10395 06
- STRESS CORROSION**  
Probability of stress-corrosion fracture under random loading  
NPO-13113 B73-10453 04
- STRESS MEASUREMENT**  
High-temperature gas/liquid stress relaxometers  
NPO-13168 B73-10457 04
- STRESS RELAXATION**  
High-temperature gas/liquid stress relaxometers  
NPO-13168 B73-10457 04
- STRESS-STRAIN-TIME RELATIONS**  
Dynamic testing of complex structures  
JSC-12569 B73-10057 06
- STRUCTURAL ANALYSIS**  
Computer program for transient response of structural rings subjected to fragment impact  
LEWIS-11926 B73-10064 09  
Automated Shell Theory for Rotating Structures (ASTROS)  
M-FS-21970 B73-10115 09
- Node-recording method for stiffness matrix wavefront reduction in structural analysis  
NPO-11620 B73-10296 09  
Structural analysis of viscoelastic materials under thermal and pressure loading  
NPO-11727 B73-10301 09  
Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
M-FS-24424 B73-10325 06  
Variable load indicator  
M-FS-21728 B73-10335 07  
Computer program for stress, vibration, and buckling characteristics of general shells of revolution  
LANGLEY-11369 B73-10363 09  
Improved procedures for mass matrix-reductions in eigenvalue solutions  
NPO-11619 B73-10384 09
- STRUCTURAL DESIGN**  
Isogrid design handbook  
M-FS-22686 B73-10395 06
- STRUCTURAL FAILURE**  
Probability of stress-corrosion fracture under random loading  
NPO-13113 B73-10453 04
- STRUCTURAL MEMBERS**  
Structural heat pipe  
GSFC-11619 B73-10364 06
- STRUCTURAL RELIABILITY**  
Optimization of structures on the basis of fracture mechanics and reliability criteria  
NPO-11645 B73-10276 06
- STRUCTURAL STRAIN**  
A self-supporting strain transducer  
LANGLEY-11263 B73-10201 06  
Creep-fatigue analysis by Strainrange Partitioning  
LEWIS-12072 B73-10314 04  
Welding high-strength aluminum alloys  
M-FS-22918 B73-10481 04
- STRUCTURAL VIBRATION**  
Vibration measurement by pulse differential holographic interferometry  
LANGLEY-11092 B73-10075 03  
Analysis of nonlinear vibrations of cylinders  
NPO-11736 B73-10302 09
- STRUTS**  
Improved fiberglass-to-metal joint produces lighter stronger fiberglass strut  
LEWIS-11661 B73-10258 08  
Boron-epoxy tubular structure members  
ARC-10737 B73-10265 08
- SUBMINIATURIZATION**  
Subminiature micropower digital recorder  
ARC-10746 B73-10491 02
- SUBSONIC FLOW**  
Theoretical prediction of interference loading on aircraft stores: Part I - Subsonic speeds  
LANGLEY-11249 B73-10184 06  
Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
LANGLEY-11305 B73-10470 06
- SUBSTRATES**  
GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 B73-10442 01  
Vapor-deposited platinum as a fuel-cell catalyst  
M-FS-21317 B73-10475 04
- Fabrication of optical reflecting diffraction gratings by light-interference phenomenon  
GSFC-11860 B73-10516 03  
Selective coating for collecting solar energy on aluminum  
M-FS-22562 B73-10527 04
- SUPERCONDUCTORS**  
A spiraled niobium tin superconductive ribbon  
LEWIS-11726 B73-10044 04
- SUPERHIGH FREQUENCIES**  
Pre-emphasis determination for an S-band constant bandwidth FM/FM station  
M-FS-22135 B73-10170 02  
Circularly-polarized multiband telemetry tracking antenna  
NPO-11264 B73-10288 02  
Improved masers for X-band and Ku band  
NPO-11437 B73-10293 02
- SUPERSONIC FLIGHT**  
Theoretical prediction of interference loading on aircraft stores: Part II -- Supersonic speeds  
LANGLEY-11250 B73-10183 06
- SUPERSONIC FLOW**  
Improved method for aerodynamic analysis of wing-body-tail configurations in subsonic and supersonic flow  
LANGLEY-11305 B73-10470 06
- SUPPORTS**  
A flexible cruciform journal bearing mount  
LEWIS-11035 B73-10001 07
- SURFACE FINISHING**  
Applying high-emittance and solar-absorbance coating to aluminum  
LANGLEY-10151 B73-10238 04
- SURFACE PROPERTIES**  
Thermal contact resistance in a non-ideal joint  
M-FS-21775 B73-10105 03
- SURFACE ROUGHNESS**  
High-friction mechanical grips  
JSC-19260 B73-10234 06
- SURVEYS**  
LEAPS (Laser electro-optical alignment pole for surveying)  
GSFC-11262 B73-10122 02
- SWITCHES**  
Thermally responsive mechanical actuator  
GSFC-11697 B73-10208 04  
High-power microstrip switch  
NPO-11965 B73-10451 02
- SWITCHING CIRCUITS**  
Impulse commutating circuit with transformer to limit reapplied voltage  
LEWIS-11849 B73-10004 01  
Theory and calculus of cubical complexes  
NPO-11491 B73-10165 09  
Compact 20-kiloampere pulse-forming-network capacitor bank  
LEWIS-12009 B73-10171 01  
Fast recharge circuit for q-switched lasers  
GSFC-11510 B73-10257 02  
Frequency shifting with a solid-state switching capacitor  
HQ-10812 B73-10259 01  
Silicon switching transistor with high power and low saturation voltage  
NPO-11565 B73-10295 01  
Logic controlled solid state switchgear  
LEWIS-12044 B73-10408 02

## SWITCHING THEORY

- High-power microstrip switch  
 NPO-11965 B73-10451 02  
 Versatile, analog-to-digital, power-regulator controller  
 NPO-13178 B73-10467 02  
 Binary-selectable detector holdoff circuit  
 M-FS-22898 B73-10487 02  
 Automatic PCM guard-band selector and calibrator  
 KSC-10812 B73-10510 02  
 Isolated transfer of analog signals  
 LANGLEY-11312 B73-10513 02

## SWITCHING THEORY

- Minimum switching network for generating the weight of a binary vector  
 NPO-11590 B73-10274 09

## SYNCHRONISM

- Time-synchronized VLF phase-tracking receiver  
 NPO-11600 B73-10275 02

## SYNCHRONOUS MOTORS

- Synchro phase selector aid  
 LANGLEY-11282 B73-10160 01

## SYSTEM EFFECTIVENESS

- Satellite auxiliary propulsion systems  
 NPO-11744 B73-10023 06  
 A summary report on system effectiveness and optimization study  
 M-FS-22126 B73-10104 09

## SYSTEMS

- A practical solar energy heating and cooling system  
 M-FS-22563 B73-10156 05

## SYSTEMS ANALYSIS

- A summary report on system effectiveness and optimization study  
 M-FS-22126 B73-10104 09  
 Dynamic power load simulator  
 JSC-14285 B73-10305 02

## SYSTEMS ENGINEERING

- A summary report on system effectiveness and optimization study  
 M-FS-22126 B73-10104 09

## T

## TACHOMETERS

- Pseudotachometer for mobile metabolic analyzer  
 M-FS-22909 B73-10480 02

## TANKS (CONTAINERS)

- Acoustic-emission signal-processing analog unit for locating flaws in large tanks  
 M-FS-24424 B73-10325 06

## TANTALUM ALLOYS

- Production of small diameter high-temperature-strength refractory metal wires  
 LEWIS-11802 B73-10003 08

## TAPE RECORDERS

- Recovery of recordings from heat damaged magnetic tapes  
 JSC-14219 B73-10173 02  
 Automated operation of an instrumentation FM tape recorder  
 LEWIS-11941 B73-10195 02  
 Processor for high-density digital tape-recorded signals  
 NPO-11399 B73-10354 02  
 Instrument for measuring thin-film belt lengths  
 NPO-13149 B73-10455 06

- Subminiature micropower digital recorder  
 ARC-10746 B73-10491 02

## TEFLON (TRADEMARK)

- Flammability control for electrical cables and connectors  
 M-FS-21584 B73-10235 02

## TELECOMMUNICATION

- A nonlinear-coherence receiver  
 NPO-11921 B73-10144 02  
 A closed, digital telephone system  
 JSC-13912 B73-10226 02  
 Spectral analysis program (SAP)  
 JSC-14310 B73-10227 09  
 Flared-cone turnstile antenna  
 LANGLEY-10970 B73-10426 02  
 RF antenna-pattern visual aids for field use  
 KSC-10821 B73-10426 02  
 Digital transmitter for data bus communications system  
 JSC-14558 B73-10511 02

## TELEMETRY

- Data multiplexer using a tree switch  
 NPO-11333 B73-10289 02  
 Flexible format, computer accessed telemetry system  
 NPO-11358 B73-10290 02  
 Automatic carrier acquisition system for phase-lock-loop receivers  
 NPO-11628 B73-10343 02  
 All-digital phase-lock loops for noise-free signals  
 NPO-11914 B73-10350 01  
 Data-aided carrier tracking loops  
 NPO-11282 B73-10356 01  
 Data compression by a decreasing slope-threshold test  
 NPO-10769 B73-10382 02  
 Sampling command generator corrects for noise and dropouts in recorded data  
 NPO-11886 B73-10390 01

## TELEPHONES

- Remote measurements by telephone  
 LEWIS-11704 B73-10010 02

## TELEPHONY

- A closed, digital telephone system  
 JSC-13912 B73-10226 02  
 Eight-channel telephone telemetry system  
 JSC-14452 B73-10320 05

## TELETYPEWRITERS

- Eye-controlled "teletypewriter"  
 LANGLEY-11564 B73-10514 02

## TELEVISION EQUIPMENT

- Digital TV image enhancement system  
 GSFC-11256 B73-10285 02

## TELEVISION TRANSMISSION

- Data compression by a decreasing slope-threshold test  
 NPO-10769 B73-10382 02

## TEMPERATURE CONTROL

- Oven temperature controller for electronic components  
 GSFC-11466 B73-10052 02  
 Balloon-borne package temperature controller  
 GSFC-11620 B73-10192 03  
 Mass flow controller for gaseous propellants  
 JSC-14221 B73-10207 06  
 Fuel-cell heat and mass plate  
 M-FS-21318 B73-10489 07  
 Solar-energy conversion system provides electrical power and thermal control for life-support systems  
 M-FS-21628 B73-10524 06

## TEMPERATURE EFFECTS

- Glass transition temperatures of liquid prepolymers obtained by thermal penetro-metry  
 NPO-11730 B73-10036 04  
 Structural analysis of viscoelastic materials under thermal and pressure loading  
 NPO-11727 B73-10301 09

## TEMPERATURE MEASUREMENT

- A flexible all-temperature pressure vessel  
 M-FS-19196 B73-10158 03  
 An improved method for obtaining a normalized junction temperature for semiconductors: A concept  
 JSC-14136 B73-10196 01  
 Atmospheric temperature measurements by Raman laser scattering  
 LEWIS-12065 B73-10251 03  
 Flexible temperature probe for biological systems  
 ARC-10796 B73-10498 05

## TEMPERATURE MEASURING INSTRUMENTS

- Limited tactile stimulus for prosthetic hands  
 M-FS-18570 B73-10078 05  
 Thermally responsive mechanical actuator  
 GSFC-11697 B73-10208 04

## TEMPERATURE PROBES

- Flexible temperature probe for biological systems  
 ARC-10796 B73-10498 05

## TEMPERATURE SENSORS

- Microminiaturized, biopotential conditioning system (MBCS)  
 JSC-14180 B73-10236 02  
 Safety monitoring system for radio-isotope thermoelectric generators  
 NPO-13285 B73-10352 02

## TEST CHAMBERS

- A versatile flammability test chamber  
 KSC-10126 B73-10111 06  
 Autoignition test cell with flexible atmosphere control  
 KSC-10198 B73-10113 04

## TEST EQUIPMENT

- Prototype ultrasonic instrument for quantitative testing  
 M-FS-22350 B73-10051 02  
 Detector for inspection of fire alarms  
 GSFC-11600 B73-10128 06  
 Synchro phase selector aid  
 LANGLEY-11282 B73-10160 01  
 Signal conditioner test set  
 KSC-10750 B73-10189 02  
 A multidegree-of-freedom vibrational apparatus  
 GSFC-11302 B73-10332 06  
 Poppet valve tester  
 LEWIS-11655 B73-10415 07  
 Versatile electronic load  
 NPO-13202 B73-10458 03

## TEST FACILITIES

- Laser system detects tower deflections  
 LEWIS-11870 B73-10243 02

## TEST STANDS

- Fatigue testing device  
 LANGLEY-10426 B73-10047 07

## TESTS

- SRC seal testing  
 M-FS-22426 B73-10199 01

## THERMAL CONDUCTIVITY

- Battery cell thermal-conductive coating increases efficiency  
 LANGLEY-10963 B73-10237 01

- New method for determining thermo-physical properties of test specimens.  
 LANGLEY-11053 B73-10447 04
- THERMAL CONTROL COATINGS**  
 Vacuum-stripped silicone binder for thermal-control paint  
 M-FS-21397 B73-10060 04  
 Thin film thermoelectric devices as thermal control coatings: A study  
 M-FS-21384 B73-10153 04  
 Effects of environmental exposure on cryogenic thermal insulation materials  
 LEWIS-12007 B73-10213 04  
 Refractory porcelain enamel passive-thermal-control coating for high-temperature superalloys  
 M-FS-22324 B73-10215 04  
 Battery cell thermal-conductive coating increases efficiency  
 LANGLEY-10963 B73-10237 01
- THERMAL ENERGY**  
 Aerotherm charring materials ablation computer program  
 LEWIS-11854 B73-10065 09  
 Metal tube used as solar engine  
 ARC-10461 B73-10493 03
- THERMAL EXPANSION**  
 Graphite/polyimide laminates with near-zero thermal expansion  
 JSC-17662 B73-10254 04  
 Thermally actuated valve  
 NPO-11846 B73-10347 06  
 Heated bimetal strip prevents damage of bearings by vibration  
 NPO-11870 B73-10348 06
- THERMAL FATIGUE**  
 Creep-fatigue analysis by strainrange partitioning  
 LEWIS-12072 B73-10314 04
- THERMAL INSULATION**  
 Evaluation of thermal insulation materials  
 NPO-11586 B73-10020 04  
 Fluid insulation to prevent ice formation in heat exchangers  
 LEWIS-11959 B73-10028 06  
 Effects of environmental exposure on cryogenic thermal insulation materials  
 LEWIS-12007 B73-10213 04
- THERMAL RESISTANCE**  
 Thermal contact resistance in a non-ideal joint  
 M-FS-21775 B73-10105 03
- THERMAL STRESSES**  
 Structural analysis of viscoelastic materials under thermal and pressure loading  
 NPO-11727 B73-10301 09  
 The static nonlinear analysis of shells of revolution (SNASOR II)  
 JSC-14495 B73-10445 09
- THERMAL VACUUM TESTS**  
 Reduced preparation time for thermal vacuum chamber tests  
 M-FS-24171 B73-10163 03
- THERMISTORS**  
 Flexible temperature probe for biological systems  
 ARC-10796 B73-10498 05
- THERMODYNAMIC PROPERTIES**  
 Handbook on thermophysical properties of oxygen  
 LEWIS-11962 B73-10187 04  
 Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
 LEWIS-11997 B73-10231 09
- An equation of state for oxygen and nitrogen  
 JSC-14465 B73-10394 04
- THERMODYNAMICS**  
 Thermal-dynamic modeling study  
 LANGLEY-11309 B73-10076 06  
 A theoretical study of aerodynamic noise generation  
 M-FS-24167 B73-10209 03  
 Analyses of unsteady isentropic-flow processes  
 M-FS-24475 B73-10482 03
- THERMOELECTRIC POWER GENERATION**  
 Safety monitoring system for radio-isotope thermoelectric generators  
 NPO-13285 B73-10352 02
- THERMOELECTRICITY**  
 Thin film thermoelectric devices as thermal control coatings: A study  
 M-FS-21384 B73-10153 04
- THERMOMETERS**  
 Thermally responsive mechanical actuator  
 GSFC-11697 B73-10208 04
- THERMOPHYSICAL PROPERTIES**  
 New method for determining thermo-physical properties of test specimens  
 LANGLEY-11053 B73-10447 04
- THERMOPLASTIC RESINS**  
 Preparing thermoplastic aromatic polyimides  
 LANGLEY-11372 B73-10319 04
- THIN FILMS**  
 Thin film thermoelectric devices as thermal control coatings: A study  
 M-FS-21384 B73-10153 04  
 A new method for the determination of thin film porosity  
 HQ-10673 B73-10286 01  
 Instrument for measuring thin-film belt lengths  
 NPO-13149 B73-10455 06
- THIN LAYER CHROMATOGRAPHY**  
 TLC determination of functionality in prepolymers  
 NPO-11731 B73-10037 04  
 'Dry-column' chromatography of plant pigments  
 ARC-10780 B73-10271 04
- THIN WALLED SHELLS**  
 Analysis of nonlinear vibrations of cylinders  
 NPO-11736 B73-10302 09  
 Metal tube used as solar engine  
 ARC-10461 B73-10493 03
- THORIUM OXIDES**  
 Oxidation resistant, thorium-dispersed nickel-chromium-aluminum alloy  
 LEWIS-11541 B73-10077 04
- THREE DIMENSIONAL FLOW**  
 Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
 M-FS-22713 B73-10371 04
- THREE DIMENSIONAL MOTION**  
 Motion compensator for holographic motion picture camera  
 M-FS-22517 B73-10434 03  
 Photography of random motion with a holographic camera  
 M-FS-22537 B73-10435 03
- THRESHOLD GATES**  
 Low phase-noise digital frequency divider  
 NPO-11569 B73-10135 01
- THUNDERSTORMS**  
 Measuring the electric field of a cloud  
 KSC-10731 B73-10074 02  
 Rocket borne instrument to measure electric fields inside electrified clouds  
 KSC-10730 B73-10176 03
- THYRATRONS**  
 A high-speed spectrograph shutter  
 HQ-10635 B73-10368 01
- TILES**  
 Improved mold release for filled-silicone compounds  
 JSC-19300 B73-10338 04  
 Strain arrestor plate for mounting rigid insulating tiles  
 JSC-14182 B73-10465 06
- TIME DIVISION MULTIPLEXING**  
 Tetrad bubble domain chip arrangement for multiplexing  
 M-FS-22296 B73-10202 02
- TIME SIGNALS**  
 Time-synchronized VLF phase-tracking receiver  
 NPO-11600 B73-10275 02
- TIMING DEVICES**  
 An inexpensive vehicle speed detector  
 M-FS-22601 B73-10157 02  
 Inexpensive programmable computer clock  
 LEWIS-11797 B73-10308 02
- TIN ALLOYS**  
 A spiraled niobium tin superconductive ribbon  
 LEWIS-11726 B73-10044 04
- TITANIUM ALLOYS**  
 Improved diffusion welding and roll welding of titanium alloys  
 LEWIS-11852 B73-10005 08  
 Braze alloys for high temperature service  
 LEWIS-11374 B73-10205 06  
 Materials data handbook on titanium 6Al-4V  
 M-FS-22796 B73-10372 04
- TITANIUM COMPOUNDS**  
 Semi-organic structural adhesive for aluminum  
 M-FS-21328 B73-10071 04
- TOOLING**  
 Measurement of dimensions and alignment with optical instruments  
 M-FS-22168 B73-10061 06
- TOOLS**  
 Diffusion welding tool  
 LEWIS-11807 B73-10072 08  
 Beam lead forming tool  
 M-FS-22133 B73-10098 07  
 A proposed hand-tool assembly for robots  
 M-FS-22266 B73-10216 07  
 Tool for installing or extracting small bulbs in limited-access spaces  
 LANGLEY-11543 B73-10433 07
- TOROIDS**  
 Computer program for the design of toroidal transformers  
 LEWIS-11878 B73-10214 09  
 Flat-band assembly for toroidal transformer cores  
 NPO-11966 B73-10391 08  
 Design parameters for toroidal and bobbin magnetics  
 NPO-13441 B73-10459 01

**TORQUE**

Variable-frequency inverter controls torque, speed, and braking in ac induction motors  
M-FS-22088 B73-10525 02

**TORSIONAL VIBRATION**

Monitor for physical property changes in solid propellants  
ARC-10702 B73-10130 03

**TRACKING NETWORKS**

Data-aided carrier tracking loops  
NPO-11282 B73-10356 01

**TRAFFIC CONTROL**

Automatic speed control of highway traffic  
M-FS-21791 B73-10100 02  
An inexpensive vehicle speed detector  
M-FS-22601 B73-10157 02

**TRAJECTORY ANALYSIS**

N-body U and K matrix program  
LEWIS-11438 B73-10012 09

**TRANSDUCERS**

Signal conditioner for potentiometer type transducers  
LEWIS-11822 B73-10015 01  
An economical arterial-pulse-wave transducer  
GSFC-11531 B73-10046 05  
Prototype ultrasonic instrument for quantitative testing  
M-FS-22350 B73-10051 02  
Limited tactile stimulus for prosthetic hands  
M-FS-16570 B73-10078 05  
A self-supporting strain transducer  
LANGLEY-11263 B73-10201 06  
Real time statistical analysis of acoustic emission signals for flaw monitoring systems  
M-FS-24402 B73-10212 03  
Measuring micro-organism gas production  
LANGLEY-11326 B73-10241 05

**TRANSFERRING**

Automatic microbial transfer  
LANGLEY-11354 B73-10229 05

**TRANSFORMERS**

Digital data command bus  
NPO-11637 B73-10035 01  
Braid read-only memory  
NPO-11570 B73-10136 01  
Design and material selection for inverter transformer cores  
NPO-11726 B73-10142 04  
Computer program for the design of toroidal transformers  
LEWIS-11878 B73-10214 09  
Isolated output for class-D dc amplifiers  
M-FS-21616 B73-10331 02  
Flat-band assembly for toroidal transformer cores  
NPO-11966 B73-10391 08  
Design parameters for toroidal and bobbin magnetics  
NPO-13441 B73-10459 01  
Isolated transfer of analog signals  
LANGLEY-11312 B73-10513 02

**TRANSIENT RESPONSE**

Computer program for transient response of structural rings subjected to fragment impact  
LEWIS-11926 B73-10064 09  
Versatile electronic load  
NPO-13202 B73-10458 03

**TRANSISTOR AMPLIFIERS**

A new dry biomedical electrode  
JSC-14321 B73-10146 02

**TRANSISTOR CIRCUITS**

A new packaging and testing concept for microelectronic components  
M-FS-20936 B73-10109 01  
Fast recharge circuit for q-switched lasers  
GSFC-11510 B73-10257 02  
Active tuning circuit  
GSFC-11340 B73-10334 02  
Ankylosis-stabilized oscillator  
GSFC-11513 B73-10392 02  
Versatile electronic load  
NPO-13202 B73-10458 03

**TRANSISTORS**

An economical arterial-pulse-wave transducer  
GSFC-11531 B73-10046 05  
Portable light detection system for the blind  
M-FS-22403 B73-10099 05  
Hermetic-coaxial package design for microwave transistors  
GSFC-10791 B73-10427 01  
GaAs transistors formed by Be or Mg ion implantation  
LANGLEY-11204 B73-10442 01

**TRANSITION TEMPERATURE**

Glass transition temperatures of liquid prepolymers obtained by thermal penetrometry  
NPO-11730 B73-10036 04

**TRANSMISSION CIRCUITS**

Digital transmitter for data bus communications system  
JSC-14558 B73-10511 02

**TRANSMITTERS**

Digital transmitter for data bus communications system  
JSC-14558 B73-10511 02

**TRANSONIC FLOW**

Total-pressure measurement in pulsating flows  
LEWIS-12077 B73-10252 03

**TRANSPARENCY**

Transparent polymeric laminates  
ARC-10783 B73-10341 04

**TRANSPONDERS**

Code-regenerative clean-up loop for a ranging transponder  
NPO-11707 B73-10141 02  
Means for mapping radiated fields and for measuring differential movement of antenna elements  
NPO-13053 B73-10452 02

**TRANSPORT PROPERTIES**

Computer program for calculation of thermodynamic and transport properties of complex chemical systems  
LEWIS-11997 B73-10231 09

**TRANSPORTATION**

Floating baffle to improve efficiency of liquid transfer from tanks  
KSC-10639 B73-10190 07  
System for measuring passenger reaction to transportation-vehicle vibration  
LANGLEY-11353 B73-10436 05

**TRAVELING WAVE AMPLIFIERS**

Event-sequence detector  
NPO-11703 B73-10278 01  
Improved masers for X-band and Ku band  
NPO-11437 B73-10293 02

**TRAVELING WAVE TUBES**

Angular magnetic field beam improves efficiency in klystrons and traveling wave tubes  
LEWIS-11610 B73-10206 03

**TUNGSTEN**

Low cost uniform heat source  
LEWIS-11903 B73-10011 02  
Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08  
Metal-metal reinforced laminar composites  
LEWIS-11790 B73-10068 04

**TUNGSTEN ALLOYS**

Production of small diameter high-temperature-strength refractory metal wires  
LEWIS-11802 B73-10003 08  
Metal-metal reinforced laminar composites  
LEWIS-11790 B73-10068 04

**TUNGSTEN CARBIDES**

High-friction mechanical grips  
JSC-19260 B73-10234 06

**TUNING**

Active tuning circuit  
GSFC-11340 B73-10334 02  
Meter circuit for tuning RF amplifiers  
NPO-11865 B73-10389 02

**TURBINE BLADES**

Refractory inserts used to form cooling passages in cast superalloy turbine vanes  
LEWIS-11169 B73-10013 08  
Low-cost clearance indicator for high speed turbomachinery  
LEWIS-12128 B73-10411 02

**TURBINE ENGINES**

Design handbook for gaseous fuel engine injectors and combustion chambers  
LEWIS-12154 B73-10412 07

**TURBINE PUMPS**

Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06

**TURBOFAN ENGINES**

A computer program for calculating design and off-design performance for turbojet and turbofan engines  
LEWIS-12010 B73-10232 09  
A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
LEWIS-12011 B73-10245 09

**TURBOJET ENGINES**

A computer program for calculating design and off-design performance for turbojet and turbofan engines  
LEWIS-12010 B73-10232 09

A computer program for calculating design and off-design performance of two- and three-spool turbofans with as many as three nozzles  
LEWIS-12011 B73-10245 09

**TURBOMACHINERY**

Computer program for transient response of structural rings subjected to fragment impact  
LEWIS-11926 B73-10064 09  
Low-cost clearance indicator for high speed turbomachinery  
LEWIS-12128 B73-10411 02

**SUBJECT INDEX**

**TURBULENT FLOW**

- Particle-fluid interactions for flow measurements  
M-FS-21727 B73-10117 06
- Computer program for the prediction of reorientation flow dynamics  
LEWIS-11816 B73-10307 09
- Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 B73-10371 04
- Porous surface microphone for measuring acoustic signals in turbulent windstreams  
ARC-10776 B73-10490 03

**TURNSTILE ANTENNAS**

- Flared-cone turnstile antenna  
LANGLEY-10970 B73-10425 02

**TWO PHASE FLOW**

- Separation of gas from liquid in a two-phase flow system  
NPO-11556 B73-10383 03

**U**

**ULTRAHIGH FREQUENCIES**

- Circularly-polarized multiband telemetry tracking antenna  
NPO-11264 B73-10288 02
- Flared-cone turnstile antenna  
LANGLEY-10970 B73-10425 02

**ULTRASONIC TESTS**

- Prototype ultrasonic instrument for quantitative testing  
M-FS-22350 B73-10051 02
- Bonded panel, flaw detection standards  
LANGLEY-11399 B73-10240 06
- Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06
- X-ray opaque additive for inspection of weld joints  
M-FS-22896 B73-10528 08

**ULTRASONICS**

- Ultrasonic calibration device  
LANGLEY-11435 B73-10420 03

**ULTRAVIOLET RADIATION**

- High-temperature-radiation analyzer  
ARC-10565 B73-10017 03
- Two new methods to increase the contrast of track-etch neutron radiographs  
LEWIS-11893 B73-10027 03

**ULTRAVIOLET REFLECTION**

- Ultraviolet reflective coating  
GSFC-11786 B73-10469 04

**ULTRAVIOLET SPECTRA**

- A magnetically focused image tube employing an opaque photocathode  
GSFC-11602 B73-10255 02
- Optical detection of oil on water  
ARC-10649 B73-10268 03

**UNIVAC 1108 COMPUTER**

- PPUAS--photopeak unfolding and self-shielding program  
NPO-13188 B73-10087 09
- A general purpose maneuver turns computer program  
NPO-13213 B73-10088 09
- Eigenvalue routine by Sturm sequence method  
NPO-11805 B73-10114 09
- Automated shell theory for rotating structures (SATROS)  
M-FS-21970 B73-10115 09

- Spectral analysis program (SAP)  
JSC-14310 B73-10227 09
- Computer program to determine the irrotational nozzle admittance  
LEWIS-12019 B73-10233 09
- Characteristics of FORTRAN  
LANGLEY-11177 B73-10322 09
- Marshall system for aerospace simulation (MARSYAS)  
M-FS-22672 B73-10432 09

**UNSTEADY FLOW**

- Total-pressure measurement in pulsating flows  
LEWIS-12077 B73-10252 03
- Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 B73-10267 02

**URINALYSIS**

- Increasing the sensitivity of the Jaffe reaction for creatinine  
NPO-11587 B73-10021 04

**URINE**

- Chemical pretreatment for the distillation of urine  
JSC-14225 B73-10224 04
- Gas chromatography of volatile organic compounds  
JSC-14428 B73-10406 04

**V**

**VACUUM CHAMBERS**

- A vacuum chamber feedthrough  
M-FS-21133 B73-10152 01
- Reduced preparation time for thermal vacuum chamber tests  
M-FS-24171 B73-10163 03

**VACUUM DEPOSITION**

- Compact 20-kiloampere pulse-forming-network capacitor bank  
LEWIS-12009 B73-10171 01

**VACUUM GAGES**

- Method of predicting ionization-type vacuum gage sensitivity for various gases  
LEWIS-12056 B73-10409 03

**VALVES**

- Poppet valve tester  
LEWIS-11655 B73-10415 07

**VANADIUM ALLOYS**

- Braze alloys for high temperature service  
LEWIS-11374 B73-10205 06

**VAPOR DEPOSITION**

- Glass encapsulation provides extra protection for IC semiconductor devices  
M-FS-21310 B73-10054 01
- Vapor phase growth of group 3, 4, and 5 compounds by HCl transport of elements  
LANGLEY-11144 B73-10056 04
- Thin film thermoelectric devices as thermal control coatings: A study  
M-FS-21384 B73-10153 04
- Vapor-deposited platinum as a fuel-cell catalyst  
M-FS-21317 B73-10475 04

**VAPORIZING**

- Experimental verification of computer spray-combustion models  
ARC-10689 B73-10031 03

**VECTORCARDIOGRAPHY**

- Vectorcardiogram  
JSC-14427 B73-10401 02

**VIBRATION MEASUREMENT**

**VECTORS (MATHEMATICS)**

- Minimum switching network for generating the weight of a binary vector  
NPO-11590 B73-10274 09

**VEGETABLES**

- Preservation of flavor in freeze dried green beans  
JSC-14149 B73-10092 05

**VELOCITY MEASUREMENT**

- Laser velocimeter with transverse and on-axis sensitivity  
ARC-10642 B73-10262 03
- Laser velocimeter for simultaneous two-dimensional velocity measurements  
ARC-10637 B73-10267 02
- Cosmic dust or other similar outer-space particles location detector  
GSFC-11291 B73-10282 02
- Small portable speed calculator  
M-FS-22638 B73-10329 07
- Three-dimensional gas turbulence measurement with a laser-Doppler velocimeter system  
M-FS-22713 B73-10371 04
- Mach-Zehnder optical configuration with Brewster window and two quarter-wave plates  
M-FS-22741 B73-10417 03
- Pseudotachometer for mobile metabolic analyzer  
M-FS-22909 B73-10480 02
- True airspeed measured by airborne laser Doppler velocimeter  
ARC-10763 B73-10506 02

**VENTILATION**

- Ion-tracer anemometer  
M-FS-21399 B73-10151 04

**VERTEBRAL COLUMN**

- Mathematical model for predicting human vertebral fracture  
ARC-10691 B73-10033 05

**VERY HIGH FREQUENCY RADIO EQUIPMENT**

- Pre-emphasis determination for an S-band constant bandwidth FM/FM station  
M-FS-22135 B73-10170 02

**VERY LOW FREQUENCIES**

- Time-synchronized VLF phase-tracking receiver  
NPO-11600 B73-10275 02

**VIBRATION**

- Hybrid coordinate formulation used for the design of attitude control systems for flexible spacecraft  
NPO-11714 B73-10300 09
- Analysis of nonlinear vibrations of cylinders  
NPO-11736 B73-10302 09
- Industrial filter bags cleaned by high-frequency vibration: A concept  
M-FS-24445 B73-10398 06
- Noncontacting devices to indicate deflection and vibration of turbopump internal rotating parts  
M-FS-22678 B73-10518 06
- Apparatus for cutting elastomeric materials  
NPO-13146 B73-10521 07
- VIBRATION EFFECTS**  
Heated bimetal strip prevents damage of bearings by vibration  
NPO-11870 B73-10348 06
- VIBRATION MEASUREMENT**  
Vibration measurement by pulse differential holographic interferometry  
LANGLEY-11092 B73-10075 03

## VIBRATION TESTS

- System for measuring passenger reaction to transportation-vehicle vibration  
LANGLEY-11353 B73-10436 05
- VIBRATION TESTS**  
Computer-controlled vibration testing  
NPO-11612 B73-10138 02  
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B73-10446 09	.....	JSC-14494	B73-10522 04	.....	LANGLEY-11415
B73-10447 04	.....	LANGLEY-11053	B73-10523 05	.....	LANGLEY-11525
B73-10448 05	.....	JSC-19187	B73-10524 06	.....	M-FS-21628
B73-10449 02	.....	JSC-14264	B73-10525 02	.....	M-FS-22088
B73-10450 07	.....	NPO-11958	B73-10526 09	.....	M-FS-22322
B73-10451 02	.....	NPO-11965	B73-10527 04	.....	M-FS-22562
B73-10452 02	.....	NPO-13053	B73-10528 08	.....	M-FS-22896
B73-10453 04	.....	NPO-13113			
B73-10454 02	.....	NPO-13123			
B73-10455 06	.....	NPO-13149			
B73-10456 06	.....	NPO-13151			
B73-10457 04	.....	NPO-13168			
B73-10458 03	.....	NPO-13202			
B73-10459 01	.....	NPO-13441			
B73-10460 02	.....	NPO-13051			
B73-10461 07	.....	NPO-13208			
B73-10462 03	.....	GSFC-11593			
B73-10463 07	.....	LANGLEY-11523			
B73-10464 08	.....	LANGLEY-11561			
B73-10465 08	.....	JSC-14182			
B73-10466 06	.....	JSC-12394			
B73-10467 02	.....	NPO-13178			
B73-10468 03	.....	GSFC-11487			
B73-10469 04	.....	GSFC-11786			
B73-10470 08	.....	LANGLEY-11306			
B73-10471 03	.....	LANGLEY-11548			
B73-10472 07	.....	M-FS-22541			
B73-10473 07	.....	M-FS-22542			
B73-10474 05	.....	M-FS-22833			
B73-10475 04	.....	M-FS-21317			
B73-10476 01	.....	M-FS-24470			